

# PART 1

## FEDERAL ANIMALS

### ENDANGERED AND THREATENED SPECIES

#### VERTEBRATES AND INVERTEBRATES

There are 21 vertebrates and invertebrates listed as federally endangered or federally threatened in Indiana. The following descriptions provide information on these species. A letter from the United State Fish and Wildlife Service (dated July 1, 2002) reports that the following species may occur in the study area: Indiana bat, bald eagle, fanshell mussel, rough pigtoe mussel, fat pocketbook mussel, and American burying beetle.

#### MAMMALS

There are two federally endangered mammals in Indiana, the Indiana myotis, *Myotis sodalis*, and the gray myotis, *Myotis grisescens*. The gray myotis is of little concern in this project as its colony (or perhaps 2 colonies, both occur in Clark County in the southeastern part of the state). There is one record near Evansville; however, it was probably a stray individual from Kentucky or from Clark County. Also, there is one record in Lawrence County in 1959 in the vicinity of Alternative 5 in Bedford.

The Indiana myotis occurs throughout the state and has been taken in 61 counties. In summer, maternity colonies require large trees with areas of sloughing bark. The sloughing bark should be in the sun quite a bit of the day. The trees can be in woods, or

they can be semi-isolated, such as along streams or near small woodlots. Roosts can occur in any of several species of trees. In Indiana, 17 primary maternity roost trees have been found to date in 11 counties. Trees involved were 10 cottonwoods, 2 American elms, 1 red elm, a bitternut hickory, a sugar maple, and a shagbark hickory. The Indiana myotis has been known to hibernate in 27 caves in southern Indiana. Of these caves, five hibernacula harbor the majority of Indiana myotis.

## **BIRDS**

Three federally endangered species of birds (Interior least tern, Kirtland's warbler, and piping plover) occur in Indiana. One, the Interior subspecies (population) of **Least Tern** (*Sterna antillarum*) has 1 breeding colony in the state in Gibson County at the Gibson Lake and Power plant, which is given special attention by PSI Energy and IDNR biologists. The tern colony is along the Wabash River, several miles west of US 41. Kirtland's warbler (*Dendroica kirtlandii*) is a rare migrant through Indiana to its breeding grounds in northern Michigan. It has been detected a few times per decade in Indiana, usually near Lake Michigan. Similarly, the piping plover (*Charadrius melodus*) is a northern species along Lake Michigan.

**Bald eagle**, *Haliaeetus leucocephalus*. The bald eagle was listed as federally endangered for many years, but was reclassified as federally threatened in 1995. It is still listed as state endangered. Wooded rivers, lakes, and reservoirs in southwestern counties are important breeding and wintering sites.

## **REPTILES**

There are no federally endangered reptiles in Indiana. The northern copperbelly watersnake (*Nerodia erythrogaster neglecta*), located north of the 40<sup>th</sup> parallel and not in the study area, is listed as federally threatened. The southern population in southwestern

Indiana is not listed as a federally species. The copperbelly watersnake is a state endangered species throughout Indiana.

## **AMPHIBIANS**

There are no federally listed amphibians in Indiana.

## **FISHES**

There are no federally listed fishes in Indiana.

## **MUSSELS**

There are 10 federally endangered mussels in Indiana. They are:

- 1) clubshell (*Pleurobema clava*)
- 2) eastern fanshell pearly mussel (*Cyprogenia stegaria*)
- 3) fat pocketbook (*Potamilus capax*)
- 4) northern riffleshell (*Epiblasma torulosa*)
- 5) orange-foot pimpleback (*Plethobasus cooperianus*)
- 6) pink mucket (*Lampsilis abrupta*)
- 7) rough pigtoe (*Pleuroblema plenum*)
- 8) tubercled blossom (*Epioblasma torulosa*)
- 9) white catpaw (*Epioblasma obliquata*)
- 10) white wartyback (*Plethobasus cicatricosus*)

Of these 10 species, only the clubshell, eastern fanshell, northern riffleshell, fat pocketbook, and rough pigtoe have records from the study area.

**Clubshell**, *Pleurobema clava*. The clubshell inhabits medium to large rivers in gravel or mixed gravel and sand. Recent records of the West Fork of the White River (1989) show this species in the West Fork of the White River.

**Eastern fanshell pearly mussel**, *Cyprogenia stegaria*. The eastern fanshell pearly mussel inhabits medium to large rivers in gravel riffles. Recent records from 1988 to 1995 show this species near the crossing of major streams for all 5 alternatives. Records are for the most part in the lower portions of the East Fork and West Fork of the White River, and the Wabash River.

**Northern riffleshell**, *Epioblasma torulosa*. The northern riffleshell inhabits medium to large rivers in gravel riffles. Recent records from 1988 to 1989 show records in the West Fork of the White River.

**Rough pigtoe**, *Pleuroblema plenum*. The rough pigtoe inhabits medium to large rivers in sand or gravel. Recent records from 1991 to 1992 show this species near the crossing of Alternative 5 in the East Fork of the White River.

**Fat pocketbook**, *Potamilus capax*. The eastern fat pocketbook inhabits large rivers in slow-flowing water in mud or sand. It was collected in 1966 and 1976 in Knox County in the vicinity of Alternatives 1 and 2, and in Owen County in the vicinity of Alternatives 2 and 5 (No date given). There are no recent records of the fat pocketbook.

## **CRUSTACEANS**

There are no federally endangered crustaceans.

## **INSECTS**

### **Federally endangered**

There are four federally listed endangered insects in Indiana. They are:

- 1) American Burying Beetle (*Nicrophorus americanus*)
- 2) Karner Blue Butterfly (*Lycaeides melissa*)
- 3) Mitchell's Satyr (*Neonympha mitchellii*)
- 4) Ohio Emerald dragonfly (*Somatochlora hineana*)

**American Burying Beetle**, *Nicrophorus americanus*. It is a carrion beetle of forested areas. The Recover Plan for the American Burying Beetle (Raithel, 1991) reports that little is known about the habitats associated with most historical collections. Until recent investigations of the conditions at the Block Island and eastern Oklahoma sites, there was only one published description of the vegetational characteristics of a *N. americanus* capture locality (Walker, 1957). During 1952, Walker collected nine *N. americanus* in a forested area described as “a park-like stand of large deciduous trees with little shrub layer and a few small trees,” which was associated with the floodplain of Badger Creek, eight miles southeast of Camden in Benton County, Tennessee. Dominant canopy tree species included *Quercus falcate*, *Quercus alba*, *Liquidambar styraciflua*, *Carya ovata*, *Nyssa sylvatica*, and *Liriodendron tulipifera*, with hornbeam (*Carpinus carolinus*) comprising most of the tree understory; grasses and sedges were dominant in the sparse ground cover.

At this time, the prevailing theory regarding the species’ decline involves habitat fragmentation, as described for bird species in Lynch and Whitcomb (1978), Robbins et al. (1989), and Yahner et al. (1989). Fragmentation of large expanses of natural habitat that historically supported high densities of indigenous species may have been a contributing factor in the decline of *N. americanus* by changing the species composition and lowering the reproductive success of prey species required for optimum reproduction. Likewise, by increasing edge habitat there may have been a concomitant increase in the occurrence and density of vertebrate predators and scavengers such as the American crow, raccoon, fox, opossum, and skunk, which compete with *N. americanus* for available carrion. In the Midwest, windbreaks, hedgerows, park development, and urban plantings have all provided new “edge” habitat for these scavengers, and even dogs. All of these animals take carrion that may be suitable for *N. americanus*. In this way, fragmented habitats not only support fewer or lower densities of indigenous species that historically may have supported *N. americanus* populations, but there is a great deal more competition for those limited resources among the “new” predator/scavenger community.

Records of the American burying beetle from the study area are in 1906 from Bloomington (Monroe County) in the vicinity of Alternatives 3 and 5, and from Vincennes (Knox County) in the vicinity of Alternatives 1 and 2. No date is given for the later record. More recent records, but still old, come from outside the study area in Posey County (Mt. Vernon) in 1965, and in Evansville in 1927.

The Karner Blue Butterfly (*Lycaeides melissa*) and the Mitchell's Satyr (*Neonympha mitchellii*) are federally endangered species; however, they have not been reported from the study area. Indiana records for the Karner Blue Butterfly come mostly from the northern tier of counties, especially from Lake County, where the Lupine grows undisturbed (Shull, 1987). Mitchell's Satyr inhabits the bogs of southern Michigan, northern Ohio and northern Indiana, and perhaps northern New Jersey. In Indiana, *N. mitchellii* has been found only in Steuben and LaGrange counties in July.

Another federally endangered species of insect is the Ohio Emerald dragonfly or Hine's Emerald (*Somatochlora hineana*). It is considered extirpated in the State of Indiana (Endangered, Threatened, and Rare Vertebrates and Invertebrates of Indiana, 2000). The only specimen ever reported for Indiana is a male collected by W. Kowlek in Gary on June 22, 1945 and given to Montgomery (1953) years later. This is the only dragonfly on the Federal Endangered Species List (Curry, 2001).

## **References**

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Shull, E. M. 1987. The Butterflies of Indiana. Published by the Indiana Academy of Science. Distributed by Indiana University Press. Bloomington and Indianapolis, Indiana. 262 pp.

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# **PART 2**

## **FEDERAL PLANTS**

### **Federally Endangered, Threatened, and Candidate Species**

Federally endangered species require Section 7 Consultation with the United States Fish and Wildlife Service (USFWS). Such consultation has begun and no federally protected plants are listed by the USFWS that should be considered in the environmental evaluation for the I-69 Tier 1 Environmental Impact Statement. Similarly, a search in the Indiana Heritage Database (updated May 2002) from the Indiana Department of Natural Resources did not uncover any records of such federally listed plants in the vicinity of any of the alternatives.

Nonetheless, there are 6 federally protected plants in Indiana. Table I - Part 2 lists these federally listed and candidate species including their status and habitat. The following descriptions of these species serves simply to “alert” field biologists in Tier 2 studies for the “likelihood” of encountering these species in the field. Descriptions and evaluations come from Robert H. Mohlenbrock, Ph.D. based upon a thorough review of Deam, Charles C., Flora of Indiana, 1940, and his personal experience with some of these plants in Illinois and Indiana. Evaluations are not meant to claim presence of any of these species to an alternative, nor to make commitments that a plant is or is not in an alternative. Such descriptions and evaluations are provided as a sensitive approach to compliment the process of field investigations in the future. A judgment on these species at this time is that none of these species have been recorded in the vicinity of any alternative and thus, there is no reason to believe they are present.

In the event that a federally listed or candidate plant is discovered in Tier 2 studies, the investigator should contact the USFWS in Bloomington, and the Indiana Department of Natural Resources (Division of Nature Preserves) in Indianapolis with the species, location and habitat. An on-site visit would be helpful in verifying the specimen.

The following descriptions use phrases such as “possible and no chance.” Such phrases are provided to give a reasonable botanical opinion as to their possible occurrence, but in no way claims complete knowledge of every habitat crossed by an alternative(s). These phrases should be interpreted for now, as “no” to the presence of these species, but recommend varying degrees of probability in their possible occurrence.

## **Plants Federally Listed in Indiana**

**Trifolium stoloniferum** Muhl. Running Buffalo Clover. Federally Endangered. Not listed by Deam. Coulter reported it from Marion Co. based on a Copeland collection in the 1870's. This rare species usually occurs in grassy areas in places where one sometimes would doubt that an endangered native species would occur. Evaluation: It is **possible** that this species may occur in an alternative(s).

**Solidago shortii** T. & G. Short's Goldenrod. Federally Endangered. Currently known only from one location in Harrison County. It has been found on rocks at the Falls of the Ohio River (Britton and Brown, 1970). Evaluation: It is **highly unlikely** that it occurs along any of the alternatives.

**Cirsium pitcheri** (Torr.) T. & G. Pitcher's Thistle. Federally Threatened. Known from dry, pure sand in dune areas of Lake and Porter counties. These habitats do not occur along the alternatives. Evaluation: There is **no** chance that this species occurs in an alternative(s).

**Asclepias meadii** Torr. Mead's Milkweed. Federally Threatened. This species occurs in good dry prairies or, in southern Illinois, on the edge of a sandstone ledge. These habitats do not occur along the I-69 alternatives. Evaluation: There is **no** chance that this species occurs in an alternative(s).

**Platanthera leucophaea** (Nutt.) Lindl. Prairie White-fringed Orchid. Federally Threatened. Deam knew this plant from five places and has it listed from seven counties, all in the northern tier of Indiana counties except for White County in northwestern Indiana. It grows in Sphagnum in tamarack bogs. This habitat does not occur in any of the I-69 alternatives. Evaluation: There is **no** chance that this species occurs in any of an alternative(s).

## **Candidate Taxon Ready for Proposal**

**Lesquerella globosa** (Desv.) Wats. Lesquereux' Mustard. This species was reported south of Indianapolis in Monroe County, but Deam had not seen it. It occurs in fields, which are plentiful along the alternatives. Evaluation: It is **possible** that this species occurs in the alternatives, but it is easily overlooked.

References: Deam, Charles C. 1940. Flora of Indiana. Wm. B. Burford Printing Company, Contractor for the State Printing and Binding. State of Indiana Department of Conservation. Published by the Department of Conservation, Division of Forestry, Indianapolis, Indiana. 1236 pp.

Britton, Nathaniel Lord and Hon. Addison Brown. 1970. An Illustrated Flora of the Northern United States and Canada. 3 Volumes. Dover Publications, Inc. New York.

Table I – Part 2. Endangered and Threatened Status, Rankings and Habitat for Federal Listed Species in I-69 Study Area

Species Name	Common Name	Federal Status	State Status	G Rank	S Rank	Woods	Savanna	Prairie	Primary	Cultural	Wetland	Stream	Lakes/ Ponds
<i>Trifolium stoloniferum</i> Muhl.	Running Buffalo Clover	LE	SE	G3	S1	✓	✓			✓		✓	
<i>Cirsium pitcheri</i> (Torr.) T. & G.	Pitcher's Thistle	LT	ST	G3	S2			✓					
<i>Asclepias meadii</i> Torr.	Mead's Milkweed	LT	SRE	G2	SX		✓	✓	G				
<i>Plantanthera leucophaea</i> (Nutt.) Lindl.	Prairie White-fringed Orchid	LT	SX	G2	SX	✓		✓			✓		
<i>Lesquerella globosa</i> (Desv.) Wats.	Short's Bladderpod, Lesquereux, Mustard	C	SE	G2	S1	✓			B		✓		
<i>Solidago shortii</i> Torr. & Gray	Short's goldenrod	LE	SE	G1	S1				G				

Federal Listing Status	State Listing Status	Global Rank		State Rank			Habitat
LE – Listed Endangered LT – Listed Threatened LTNL – Listed Threatened/Not Listed C – Candidate taxon, ready for proposal	SE- State Endangered ST- State Threatened SR – State Rare SG – State Significant SSC – State Special Concern SX – State Extirpated SRE – State reintroduced	G1 – Extremely Rare G2 – Rare G3 – Uncommon G4 – Many Occurrences G5 – Very Common GU – Uncertain	T1 – Subspecies Extremely Rare T2 – Subspecies Rare T3 – Subspecies Uncommon T4 – Subspecies Many Occurrences T5 – Subspecies Very Common	S1 – Extremely Low S2 – Rare S3 – Uncommon S4 – Many Occurrences S5 – Very Common SX – Extirpated SZN – Widely Dispersed/Migratory or Non-Breeding SR – Reported but without persuasive documentation SRFN – Reported Falsely in Literature/Migratory or Non-Breeding	S1B – Extremely Rare/Breeding S2B – Rare/Breeding S3B – Uncommon/Breeding S4B – Many Occurrences/Breeding S5B – Very Common/Breeding	B – Bluff G – Glade LS – Lake Shore	

**Source for status and rank:** Indiana Department of natural Resources, Division of Nature Preserves, at <http://www.state.in.us/dnr/naturepr/endanger/plant.html>

**Source for candidate status:** Endangered and Threatened Wildlife and Plants; Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened: Annual Notice of Findings on Recycled Petitions; Annual Description of Progress on Listing Actions. 67 FR 40657-40679; June 13, 2002

**Primary source for habitat classifications:** Iverson, L. R., D. Ketzner, and J. Karnes. 1999. Illinois Plant Information Network. Database at <http://www.fs.fed.us/ne/delaware/ilpin.html>. Illinois Natural History Survey and USDA Forest Service.

**Supplementary source for habitat classifications:** NatureServe Explorer, at <http://www.natureserve.org/explorer/>



# PART 3

## STATE ANIMALS

### ENDANGERED, THREATENED & SPECIAL CONCERN

#### VERTEBRATES AND INVERTEBRATES

The following list describes 114 state listed vertebrate and invertebrate species from Indiana. Descriptions include the species, range, habitat, and information on their occurrence in or not in southwestern Indiana. The purpose of this section is to provide a reasonable record of species that occur in southwestern Indiana that could be in an alternative(s).

### MAMMALS

#### State Endangered

There are ten mammals officially listed as endangered in Indiana. They are:

- 1) Badger (*Taxidea taxus*)
- 2) River Otter (*Lutra canadensis*)
- 3) Indiana bat (*Myotis sodalis*)
- 4) Gray bat (*Myotis grisescens*)
- 5) Southeastern myotis (*Myotis austroriparius*)
- 6) Evening bat (*Nycticeius humeralis*)
- 7) Swamp Rabbit (*Sylvilagus aquaticus*)
- 8) Franklin's Ground Squirrel (*Spermophilus franklinii*)
- 9) Allegheny woodrat (*Neotoma magister*)
- 10) Bobcat (*Lynx rufus*)

The badger is nowhere common in Indiana, but it has been increasing its range until it now occurs essentially throughout the state.

The river otter was extirpated in the state, but was reintroduced during the years 1995 to 1999. It appears to be doing quite well and presently occurs in Posey, Gibson, Pike and Dubois counties.

Besides the Indiana and gray myotis, there are 6 other species of mammals that are currently considered as state endangered, the southeastern myotis, *Myotis austroriparius*, the Evening bat, *Nycticeius humeralis*, the Swamp rabbit, *Sylvilagus aquaticus*, Franklin's Ground squirrel, *Spermophilus franklinii*, the Allegheny Wood Rat, *Neotoma magister*, and the bobcat, *Lynx rufus*. Of these, the Swamp rabbit occurs primarily in western Gibson County, near the Wabash River, thus far west of the proposed routes. Franklin's Ground Squirrel occurs in far northern Indiana, and the Allegheny Wood rat occurs along the Ohio River bluffs in south central Indiana. Therefore those three species need no further consideration.

Although there is one recent unverified report of the southeastern myotis in southern Indiana (along the White River near Washington). The species is considered to be extirpated in the state.

The evening bat occurs in the Wabash bottomlands from the Ohio River north at least to Terre Haute, and also occurs in the vicinity of the White River and even some smaller streams. Whitaker (per com) has heard evening bats in the vicinity of the US 41 bridge

over the White River. Also, it is a strong possibility in the vicinity of the Patoka River, although it has not been captured there. In addition, evening bats were found along Honey Creek in the vicinity of the Terre Haute bypass.

The bobcat, which was considered very rare in the middle of the 20<sup>th</sup> century, has increased its numbers since 1970. There have been 42 verified reports of this species in Indiana, mostly in several counties in southwestern Indiana. Any large wooded areas along any of the routes could harbor bobcats, but Alternatives 3 and 5 would be the most likely alternatives to encounter bobcats. A radio-collared bobcat was reported from the Beanblossom Bottoms this year.

### **Special concern species**

There are seven species of special concern mammals in Indiana, including three insectivores (pigmy shrew, smoky shrew, star-nosed mole), Rafinesque's big-eared bat, the pocket gopher, the harvest mouse and the least weasel. The range of the star-nosed mole, the pocket gopher and the harvest mouse are too far north to be in the study area, but some of the other species may occur. These species are discussed below.

**Pygmy shrew.** *Sorex hoyi*. The pygmy shrew was first found in Indiana in 1982 and occurs only in the south-central unglaciated hill country. Indiana pygmy shrews are the smallest of the pygmy shrews, averaging about 2.0 grams, and vie with the bumblebee bat as the world's smallest mammal.

**Smoky shrew.** *Sorex fumeus*. The smoky shrew was first found in Indiana in 1982 and occurs only in the south-central unglaciated hill country. It has a range very similar to that of the Pygmy shrew.

**Least weasel.** *Mustela nivalis*. The least weasel lives in grassy fields and feeds heavily on voles. Relatively little is known about its life history and relatively few individuals have been taken in Indiana. It is presumably a northern species in Indiana, but has been found in Indiana south to Vigo, Clay, and Monroe counties.

**Rafinesque's big-eared bat.** *Corynorhinus rafinesquii*. This species is seldom seen in Indiana, but appears to be of accidental occurrence. One was reported (probably correctly) in Squire Boone Caverns in Harrison County.

## **BIRDS**

### **State Endangered**

Two bitterns and two herons are state endangered: **American bittern** (*Botaurus lentiginosus*), **Least bittern** (*Ixobrychus exilis*), **Yellow-crowned night-heron** (*Nyctanassa violacea*) and **Black-crowned night-heron** (*Nyctanassa nycticorax*). All are known to breed in the state.

The two bitterns require marshes, and the night-herons wooded swamps. Both bitterns are most common in the northern half of the state, but American bittern use "mine grasslands" in the southwest. The yellow-crowned night-heron is largely restricted to southern Indiana, especially the southwest; occurring along muddy river sloughs, temporary backwaters, and cypress swamps.



**Osprey**, *Pandion haliaetus*. The osprey is primarily a spring and fall migrant in Indiana, and is observed on large rivers and lakes. It does not currently breed in the study area.

**Northern harrier**, *Circus cyaneus*. This raptor is an uncommon migrant and winter resident in grassy areas in Indiana, and a rare and local breeder. Although near the southern limit of its breeding range in Indiana, large strip mines reclaimed as grasslands are attractive to it, and some pairs breed in the southwestern counties, including Pike, Daviess, and Greene.

**Peregrine falcon**, *Falco peregrinus*. Reintroduced as a breeding bird in city settings, with nests on buildings.

**Three rails** are state endangered. The King rail, *Rallus elegans*, is a large rail that breeds sparsely in Indiana wetlands dominated by cattail, sedges, rushes and grass, and forages in most areas with water depth up to about 25 cm. It appears to be rare throughout Indiana. The Virginia rail, *Rallus limicola*, is a rare migrant through the area with habitat preferences similar to King rail. The Black rail, *Laterallus jamaicensis*, is accidental in the state.

**Sandhill crane**, *Grus canadensis*. Uncommon migrant through area, using rivers and sometimes landing in fields.

**Upland sandpiper**, *Bartramia longicauda*. The upland sandpiper breeds in midwestern grasslands, but has a northerly distribution. The southern edge of its breeding range is central Indiana, roughly along Interstate 70. Most known breeding populations are in the northwest corner of the state, although there is a recent record from Owen County. Although upland sandpipers must make some use of grassland habitat in southern Indiana during migration, they are rarely observed as migrants, in contrast to the next 2 species.

**Black tern**, *Chlidonias niger*. Breeds only in northern Indiana, but migrates throughout; prefers marshes with much open water.

**Barn owl**, *Tyto alba*. The barn owl is now mainly restricted to the southern half of the state. It nests mainly in wooden barns, and thus occurs in agricultural areas with traditional farming practices. Daviess and Pike counties are among the best southern counties for it.

**Short-eared owl**, *Asio flammeus*. This owl requires large grasslands. A few are permanent residents, and many more use grasslands of southwestern Indiana in migration or winter. In the study area, it is known mainly from the large reclaimed mine grasslands in Pike, Daviess, Greene, and Sullivan counties.

**Loggerhead shrike**, *Lanius ludovicianus*. The loggerhead shrike, threatened throughout the northeastern and midwestern United States, is a rare and declining permanent resident in southwestern Indiana. Population levels have been assessed since 1990 by IDNR and other biologists. The strongholds for this species are in Daviess and Dubois counties, in agricultural country. Most territories are along gravel roads and lanes, with shortgrass pasture, grazing activity, fencerows, and barbed wire. They flourish in traditional agricultural settings, as in Amish communities in Daviess County. They are associated with gravel and paved secondary roads with light traffic, and sometimes hunt along such roads (Castrale, J. S. and A. Ferchak. 2001. Survey of Loggerhead shrikes in their primary range in Indiana. 1999-2000. Indiana Audubon Quarterly 79:147-162).

**Marsh wren**, *Cistothorus palustris*. Breeds in marshes of northern Indiana; uses cattail marshes of southwestern Indiana during migration.

**Sedge wren**, *Cistothorus platensis*. The sedge wren is another grassland bird with a northern distribution, and is more common in northern than southern Indiana. It has the curious habit of extending its breeding range *southward* during the course of each breeding season (being common early in summer on the Canadian border, and not appearing in central Indiana until July and August, when it is territorial and breeds). In a study of strip mine grassland birds in southwestern Indiana, most individuals occurred in the northern counties of the study area (Vermillion and Clay; DeVault et al. 2002). However, there are a number of breeding records for Daviess and Greene counties

(Reference: DeVault TL, Scott PE, Bajema RA, Lima SL. 2002. Breeding bird communities of reclaimed coal-mine grasslands in the American Midwest. J. Field Ornithology 73: 268-275).

**Golden-winged warbler**, *Vermivora chrysoptera*. A rare migrant in the study area. Breeding occasionally in northern Indiana. Migration habitat is wooded areas.

**Henslow's sparrow**, *Ammodramus henslowii*. This species has declined more precipitously than any grassland bird in recent decades. It requires relatively large and older grasslands, with deep litter and tall grass, but accepts agricultural pastures as well as reclaimed grasslands on former coal mines. Large grasslands in Pike, Daviess, and Greene counties are important breeding areas. (Reference: Bajema RA, DeVault TL, Scott PE, and Lima SL. 2001. Reclaimed coal mine grasslands and their significance for Henslow's Sparrows in the American Midwest. The Auk 118: 422-431).

**Trumpeter swan**, *Cygnus buccinator*. Re-introduced population in Wisconsin and Minnesota migrates to that area in fall and winter (since approximately 1997). Restricted to wetlands and open water. Any area with multiple lakes or ponds in southwestern Indiana could be used between November and March.

**Bewick's wren**, *Thryomanes bewickii*. Formerly common, but since 1950s very rare in Indiana and Midwest. Not recorded even once annually in state; a few records every 10 years. Not likely to be impacted in the study area.

**Bachman's sparrow**, *Aimophia aestivalis*. Very few records since 1950; extirpated as a breeding bird.

**Yellow-headed blackbird**, *Xanthocephalus xanthocephalus*. Occurs only in northwestern Indiana.

## **Special Concern Species**

**Great egret**, *Ardea alba*. Occurs mainly as post-breeding migrant from June to September. No breeding colonies known recently for study area. Uses large lakes with dead trees, and flooded fields.

**Sharp-shinned hawk**, *Accipiter striatus*. Breeds in conifers, mostly in northern Indiana; winters and migrates throughout study area. Hunts in mixed wooded and agricultural areas.

**Red-shouldered hawk**, *Buteo lineatus*. The red shouldered hawk, a year-round resident, uses bottomland-riparian forests, frequently-ponded flatwoods, or hillside forests near a creek or river (Castrale et al. 1998, Atlas of breeding birds of Indiana). It is most common in the southern third of the state. Declines are apparently due to fragmentation of upland and bottomland forests and competition with red-tailed hawks, which flourish near highways.

**Broad winged hawk**, *Buteo platypterus*. The broad winged hawk is a rare summer resident and uncommon migrant in Indiana. As a breeder, it is most common in the southern part of the state. It requires extensively forested landscapes, often along rivers.

**Mississippi kite**, *Ictinia mississippiensis*. Recently expanding breeding range into southern Indiana, but still very local. Occurs in Pike and Spencer counties, and prefers prairies and flooded forests.

**Cerulean warbler**, *Dendroica cerulea*. Cerulean warbler requires large tracts of deciduous forest with open understories and mature trees. Floodplain forests support the highest densities, but upland forests are also used. In the study area, densities are probably highest in Monroe, Owen, eastern Greene, and Martin counties. This is a classic example of a big woods species adversely affected by fragmentation of habitat by highways.

**Worm-eating warbler**, *Helmitheros vermivorus*. The worm-eating warbler is an uncommon and local summer breeding species in Indiana, requiring extensive woods with ravines and slopes. Within the study area, it is most common in Martin, Lawrence, Monroe, and Morgan counties.

**Black-and-white warbler**, *Mniotilta varia*. Black-and-white warbler's main breeding area in Indiana is the south-central region, in rugged sections of forested areas with dry hillsides, ridges, and deep ravines. Breeding records are known for Martin, Monroe, and Owen counties.

**Hooded warbler**, *Wilsonia citrina*. Hooded warbler is a "forest gap species", using dense understory vegetation, but within large tracts of deciduous forest. In the study area, it is probably most common in Martin and Monroe counties.

**Western meadowlark**, *Sturnella neglecta*. Does not occur in southwestern Indiana. Breeds locally in grassland in several northwestern counties.

## REPTILES

### State endangered

There are 6 state endangered turtles and 9 state endangered snakes in Indiana. They are:

### Turtles

**Alligator Snapping turtle**, *Macrolemys teminckii*. It is very rare, although one individual was recently found in the White River near Indianapolis.

**Eastern mud turtle**, *Kinosternon subrubrum*. This turtle occurs in quiet, shallow bodies of water. Grant (1936) and Stille (1947) have collected it in Indiana from meadow ponds, marshes, and drainage ditches. Its range in southwestern Indiana coincides with the Wabash Lowland Region.

**Blanding's turtle**, *Emydoidea blandingii*. - This is a northern Indiana turtle of the lake plains. There are no records of this turtle in the study area.

**Ornate box turtle**, *Terrapene ornate*.- This turtle is found for the most part in northwestern Indiana; however, one record comes from Daviess County which indicates it possible presence in small, isolated populations on the sand prairies in that part of the state.

**Spotted turtle**, *Clemmys guttata* – The range of this species is in northern Indiana.

**Hieroglyphic river cooter**, *Chrysemys concinna hieroglyphica*. The Indiana records are located along the Wabash River from its mouth to the mouth of the White River. Minton (1972) reports that to his knowledge, no turtles have been collected in Indiana since 1950, and the local population may well be extinct.

## **Snakes**

**Kirtland's snake**, *Clonophis kirtlandii*. This snake is unique in being best known from populations inhabiting metropolitan areas. Its habitat is open and grassy with few trees; the soil is clay often quite dry in summer; there is water, frequently a sluggish creek but sometimes a pond or ditch; and earthworms are plentiful. Records from relatively undisturbed habitats are few. Its range is within the upper half of the study area.

**Butler's garter snake**, *Thamnophis butleri*. The range of Butler's garter snake is not within southwestern Indiana.

**Timber rattlesnake**, *Crotalus horridus*. Optimum habitat for the timber rattlesnake are high, dry ridges with oak-hickory forest interspersed with open areas. Such areas are usually rocky. Such habitat is available in the Crawford Upland, Mitchell Karst Plain, and Norman Upland, or within the eastern half of the study area. It is not a bottomland or lowland species.

**Scarlet snake**, *Cemophora coccinea*. The range for this species is in southeastern Indiana. No records are known from southwestern Indiana.

**Smooth Green Snake**, *Opheodrys vernalis*. The range of the smooth earth snake is in northern Indiana. No records are known from southwestern Indiana.

**Crowned Snake**, *Tantilla coronata*. The only known records of this species is from southeastern Indiana.

**Cottonmouth**, *Agkistrodon piscivorus*. A population of cottonmouths have been reported from a location within Dubois County. No records are known from the study area.

**Eastern Massasauga**, *Sistrurus catenatus*. This snake has a northern distribution in Indiana.

**Northern Copperbelly Watersnake** (*Nerodia erythrogaster neglecta*). There are actually two populations of the copperbelly watersnake, a northern and southern population as separated by the 40<sup>th</sup> parallel. Both populations are state endangered in Indiana.

## **Special Concern Species**

There are two species of reptiles of special concern in Indiana, the western ribbon snake (*Thamnophis proximus*), and the rough green snake (*Opheodrys aestivus*).

**Western Ribbon Snake**, *Thamnophis proximus*. Records for this snake are for the most part in northwestern Indiana. There is though one single record from Monroe County, and apparently valid literature records from Vigo County. It has an inferred range in southwestern Indiana within principally the Wabash Lowland Region.

**Rough Green Snake**, *Opheodrys aestivus*. It's range is principally in southern Indiana confined largely to the unglaciated plateau and adjoining areas. There are a number of records of this snake in southwestern Indiana.

## AMPHIBIANS

### State Endangered

There are five species of amphibians in Indiana listed as state endangered. They are the four-toed salamander (*Hemidactylium scutatum*), the green salamander (*Aneides aeneus*), hellbender (*Cryptobranchus alleganiensis*), northern crawfish frog (*Rana areolata*), and the northern red salamander (*Pseudotriton ruber*). The three salamanders (green, hellbender, and northern red) do not occur in the study area and should not be impacted by any of the alternatives. The four-toed salamander and northern crawfish frog have been reported from the study area.

**Four-toed Salamander**, *Hemidactylium scutatum*. The four-toed salamander is found mostly in northern Indiana and even there its populations are local and scattered. In southern Indiana, records are based on small local populations, some of which no longer exist. Several individuals were taken from a bog which has since been destroyed by the Monroe Reservoir. One was taken in 1959 at Bradford Woods near Martinsville.

**Northern crawfish frog**, *Rana areolata*. The range for the northern crawfish frog is southwest and west central portions of Indiana. They normally live in crayfish burrows and emerge at night to feed. Their occurrence in open, grassy, rather damp areas where there are burrows of the large, chimney-building crayfish. Such habitat exists in the study area with a emphasis upon the Patoka River bottoms.



## **Special Concern Species**

There are five species of amphibians of special concern in Indiana. These species are the blue-spotted salamander (*Ambystoma laterale*), eastern spadefoot (*Scaphiopus holbrookii*), mudpuppy (*Necturus maculosus*), northern leopard frog (*Rana pipiens*), and plains leopard frog (*Rana blairi*). Of these, only the eastern spadefoot and mudpuppy occur in the project area.

**Eastern spadefoot**, *Scaphiopus holbrookii*. The range of the eastern spadefoot is the southern third of Indiana. It is a toad that prefers regions of loose or sandy soil at low elevations. They are usually found in open country and have been reported from urban and heavily cultivated situations (Minton, 1972). Habitat for this species is available in some of the alternatives.

**Mudpuppy**, *Necturus maculatus*. The mudpuppy is found throughout Indiana; however, not collected very often. It's numbers appear to have decreased since the 1940's.

## **FISHES**

### **State Endangered**

There are presently 12 state listed endangered fishes in Indiana. They are:

- 1) lake sturgeon (*Acipenser fulvescens*)
- 2) northern cavefish (*Amblyopsis spelaea*)
- 3) redbreast dace (*Clinostomus elongatus*)
- 4) bluebreast darter (*Etheostoma caeruleum*)
- 5) harlequin darter (*Etheostoma histrio*)
- 6) spotted darter (*Etheostoma maculatum*)

- 7) spottail darter (*Etheostoma squamiceps*)
- 8) Tippecanoe darter (*Etheostoma tippecanoe*)
- 9) variegate darter (*Etheostoma variatum*)
- 10) popeye shiner (*Notropis ariommus*)
- 11) gilt darter (*Percina evides*)
- 12) southern cavefish (*Typhlichthys subterraneus*)

**Lake Sturgeon**, *Acipenser fulvescens*. The lake sturgeon is a large fish of the quieter portions of large rivers and lakes (Gerking, 1945). It has been found in the Wabash River, Ohio River and Lake Michigan in the past; however, a 1986 Survey of the Fish Communities and Water Quality of the Lower 200 miles of the West Fork and Main Stem White River (Environmental Science and Engineering, Inc., 1987) did not find this species in the White River drainage, nor was it found in the Wabash River since 1977 (Gammon, 1994 and 1995). Indiana has an ongoing study of lake sturgeon populations in the East Fork of the White River. Over the past 5 years, the Nongame and Endangered Wildlife Program of the Indiana Department of Natural Resources has found 70 different lake sturgeons from the East Fork of the White River ranging in size from 3 to 97 pounds and 2 to nearly 7 feet in length.

**Northern Cavefish**, *Amblyopsis spelaea*. The northern cavefish was first described from a specimen taken from the River Styx in Mammoth Cave before 1842 (DeKay, 1842). The fish is still found in Mammoth Cave, which is the southernmost extent of its known distribution. The northern cavefish has also been reported as far north as Blue Springs Cave in Lawrence County, Indiana, just south of the East Fork of the White River (Pearson and Boston, Jr., 1995). The largest population of the northern cavefish have been reported from Blue Springs Caverns (per com - Manager of Blue Springs Caverns). Reliable reports of this species have also come from Orange, Washington, Crawford and Harrison Counties in Indiana. There have been two questionable reports of sightings in Jefferson County, Indiana, and a short-lived population was transplanted into Mayfield's Cave in Monroe County in the early part of this century. Its range in Indiana does not appear to be north of the East Fork of the White River.

**Redside Dace**, *Clinostomus elongates*. The redbreast dace is a northern species in Indiana and has never become generally established in Indiana.

**Bluebreast Darter**, *Etheostoma caeruleum*. The habitat for the bluebreast darter is swift, rocky riffles. The majority of the collections of the bluebreast darter are in the Blue River in southeastern Indiana outside the study area. However, there is one older record from the East Fork of the White River at Shoals, Martin County (Gerking, 1945). In addition, there are 1997 and 1998 records of the bluebreast darter in the East Fork of the White River near Shoals through to the Martin State Forest.

**Harlequin Darter**, *Etheostoma histrio*. Gerking (1945) reports that the harlequin darter must be exceedingly rare in southern Indiana for Forbes and Richardson (1920) did not list it from Illinois and he did not collect it in Indiana in the early 1940's. Smith (1979) reported it only from a 20-mile stretch of the Embarras River in Cumberland and Jasper counties, Illinois and considers the harlequin darter extremely rare in Illinois. A most recent record of the harlequin darter has come from Gibson County (per com - USFWS). Harlequin darters were found in the channelized portion of the Patoka River at its confluence with the South Fork of the Patoka River. This location is just downstream of the crossing of the Patoka River by Alternatives 3, 4 and 5. In addition, there is a 1997 record of the harlequin darter near the Martin State Forest and a 1998 record in the East Fork of the White River north of Petersburg.

**Spotted Darter**, *Etheostoma maculatum*. Gerking (1945) did not find this darter in Indiana in the early 1940's and no records have come from the study area (IDNR – Heritage Database).

**Spottail Darter**, *Etheostoma squamiceps*. The spottail darter inhabits the far reaches of southwestern Indiana in Posey and Vanderburgh Counties (Cervone et al., 1989; Grannan and Lodato, 1986). Its habitat is a clear, small stream with a rocky substrate seated on a

stiff substrate. The majority of the spottail darters were in Carpentier Creek, a tributary of Bayou Creek. This drainage is not within the study area.

**Tippecanoe Darter**, *Etheostoma tippecanoe*. The Tippecanoe darter was taken in early to mid 1940's by Gerking in the East Fork of the White River near Shoals. Similarly, there is a 1997 record of the Tippecanoe Darter in the East Fork of the White River near the Martin State Forest.

**Gilt Darter**, *Percina evides*. Gerking (1945) did not collect this species in the early 1940's; however, recent records of the gilt darter are available in the study area for Alternatives 2, 3, 4 and 5 as they cross the West Fork of the White River. It has been reported in Morgan County (1997) in Alternatives 2C and 4C.

**Southern Cavefish**, *Typhlichthys subterraneus*. The range of this species is principally in eastern Kentucky and south. No southern cavefish have been recorded from the study area.

**Greater Redhorse** (*M. valenciennesi*). No records of this species are available within the study area (IDNR Heritage Database).

**Variegate Darter**, *Etheostoma variatum*. Gerking (1940) found the variegate darter in Big Blue River and Whitewater River. Neither of these streams are in the study area. No records from the Indiana Heritage Database show records in the vicinity of the alternatives.

## **Special Concern Species**

There are presently 6 state listed special concern fishes in Indiana. They are:

- 1) bantam sunfish (*Lepomis symmetricus*)
- 2) blue sucker (*Cycleptus elongatus*)

- 3) cisco (*Coregonus artedi*)
- 4) crystal darter (*Crystallaria asprella*)
- 5) eastern sand darter (*Etheostoma pellucidum*)
- 6) northern studfish (*Fundulus catenatus*)
- 7) Ohio river muskellunge (*Esox masquinongy*)
- 8) river redhorse (*Moxostoma carinatum*)

**Bantam Sunfish**, *Lepomis symmetricus*. The bantam sunfish occurs in swamps and bottomland lakes in association with dense beds of vegetation in the shallow water (Smith, 1979). Such areas provide clear water and benthic snails, crustaceans, and insects upon which it feeds. It has been reported in Greene County (1994) in Alternative 4 in a bottomland lake. This area of the West Fork of the White River drainage shows a most sinuous stream channel and many wetlands and backwater areas.

**Blue Sucker**, *Cycleptus elongatus*. Recent records of this species show collections in the Petersburg area (Alternatives 3, 4 and 5) and in Putnam County (Alternative 1).

**Cisco**, *Coregonus artedis*. The range of this species is Lake Michigan.

**Crystal Darter**, *Crystallaria asprella*. The crystal darter was not recorded by Gerking (1945). In Illinois, it is considered extirpated and taken only from the Rock River at Cleveland, Erie, and Milan; the Little Wabash River at Effingham; and the Wabash River near Vincennes and New Harmony, Indiana (Smith, 1979). All records are pre-1901. A review of the IDNR Heritage database does not show this species from the study area.

**Eastern Sand Darter**, *Etheostoma pellucidum*. Older records (1941, 1942, 1965) show this species in Putnam County (Alternative 1), near Sanborn and in the West Fork of the White River (Alternative 2), near Elnora (Alternative 3), and near Washington (Alternative 5). It has also been reported in Owen County (1941) in Alternative 2 and 4. There is a most recent record of this species in Putnam County (2000) in Alternative 1.

**Northern Studfish**, *Fundulus catenatus*.. No records of this species are available within the study area (IDNR Heritage Database). Its range is within Sugar Creek of Shelby County (East of Franklin).

**Ohio river muskellunge**, *Esox masquinongy*. Gerking (1940) considered the muskellunge rare in Indiana. A sizable population existed at that time in the Little Blue River. Today, no records from any of the alternatives are known.

**River Redhorse** (*Moxostoma carinatum*). No records of this species are available within the study area (IDNR Heritage Database).

## MUSSELS

Reference: Cummings, K. S. and Cristine A. Mayer. 1992. Freshwater Mussels of the Midwest. Illinois Natural History Survey, Champaign. Manual 5. 194 pp.

### State Endangered

There are 5 state listed endangered mussels and 1 state listed threatened mussel in Indiana. They are:

- 1) Long-solid (*Fusconaia surotunda*)
- 2) pyramid pigtoe (*Pleuroblema pyramidatum*)
- 3) rabbitsfoot (*Quadrula cylindrical*)
- 4) sheepnose (*Plethobasus cyphyus*)
- 5) snuffbox (*Epioblasma triquetra*)
- 6) ice thorn (*Carychium exile*)

**Longsolid**, *Fusconaia subrotunda*. The longsolid inhabits large rivers in gravel. Recent records from 1988 to 1991 show this species near the crossing of major streams for all of the alternatives.

**Pyramid Pigtoe**, *Pleurobema pyramidatum*. The pyramid pigtoe inhabits medium to large rivers in sand or gravel in areas with a good current. Recent records from 1988 to 1991 show this species near the crossing of major streams for all of the alternatives. It has been reported from Morgan County (1989) in Alternatives 2C, 3B, 3C, 4C and 5B.

**Rabbitsfoot**, *Quadrula cylindrical*. The rabbitsfoot inhabits medium to large rivers in mixed sand and gravel. Recent records from 1988 to 1991 show this species near the crossing of major streams for all of the alternatives. It has been reported from Morgan County (1989) in Alternatives 2C, 3B, 3C, 4C and 5B.

**Sheepnose**, *Plethobasus cyphus*. The sheepnose inhabits medium to large rivers in gravel or mixed sand and gravel. There are two older records of this species from near the town of Huron in 1967 (in the vicinity of Alternative 5), and two more recent records in 1988 show this species in Knox County near Alternatives 1 and 2.

**Snuffbox**, *Epioblasma triquetra*. The snuffbox inhabits medium to large rivers in clear, gravel riffles. It was collected once in 1991 near Shoals. Alternative 5 crosses the East Fork of the White River north of Shoals.

**Ice thorn**, *Carychium exile*. The ice thorn is a state threatened mussel. It inhabits medium to large rivers. There has been one record of this species from 1992 from Lawrence County in the vicinity of Alternative 5. No other records for this species are known.

## **Special Concern Species**

There are 11 listed special concern mussels. They are:

- 1) eclipse (*Venustaconcha ellipsiformis*)
- 2) kidneyshell (*Ptychobranhus fasciolaris*)
- 3) little spectaclecase (*Villosa lienosa*)

- 4) Ohio pigtoe (*Pleurobema cordatum*)
- 5) pointed campeloma (*Campeloma decisum*)
- 6) purple lilliput (*Toxolasma lividus*)
- 7) rayed bean (*Villosa fabalis*)
- 8) round hickorynut (*Obovaria subrotunda*)
- 9) salamander mussel (*Simpsonaias ambigua*)
- 10) swamp lymnaea (*Lymnaea stagnalis*)
- 11) wavy-rayed lampmussel (*Lampsilis faciola*)

Of these 11 mussels, only the round hickorynut, Ohio pigtoe, kidneyshell and salamander mussel have been reported in the vicinity of the proposed alternatives.

**Round hickorynut**, *Obovaria subrotunda*. The round hickorynut inhabits medium-sized streams in sand and gravel in areas with moderate flow. Recent records from 1989 to 1991 show this species near the crossing of major streams for Alternatives 2-5. No records of this species have been reported in the vicinity of Alternative 1. It has been reported from Morgan County (1989) in Alternatives 2C, 3B, 3C, 4C and 5B.

**Ohio pigtoe**, *Pleurobema cordatum*. The Ohio pigtoe inhabits medium to large rivers in sand or gravel in areas with moderate flow. Recent records from 1988 to 1991 show this species near the crossing of major streams for all of the alternatives. It has been reported from Martin County (1992) in the vicinity of Alternative 5.

**Kidneyshell**, *Ptychobranhus fasciolaris*. The kidneyshell inhabits medium to large rivers in gravel. Recent records from 1990 to 1991 show this species near the crossing of major streams for Alternatives 2-5. No records have been reported in the vicinity of Alternative 1.

**Salamander mussel**, *Simpsonaias ambigua*. The salamander mussel inhabits medium to large rivers on mud or gravel bars and under flat slabs or stones. There are 2 older



records of this species near Shoals (1964) in the vicinity of Alternative 5, and near Reelsville (1967) in the vicinity of Alternative 1.

## **CRUSTACEANS**

### **State Endangered or Rare**

There is 1 state endangered crayfish, 1 state endangered isopod, and 1 state rare isopod reported from the study area. The crayfish is the troglobitic crayfish (*Orconectes inermis*). Records indicate its occurrence principally in the vicinity of Alternatives 3 and 5 followed in much lower occurrences in the vicinity of Alternatives 2 and 4. No records have been reported in the vicinity of Alternative 1. It has been reported in Lawrence County (1874 – 1978) and Martin County (1975) in the vicinity of Alternative 5, and in Monroe County (1955-1975) in Alternative 3.

The state endangered isopod is the Jordan cave isopod (*Caecidotea jordani*). It was collected near Bloomington (1961) in the vicinity of Alternatives 3 and 5.

The state rare isopod is Packard's cave amphipod (*Crangonyx packardi*). It was collected near Bedford (no date) in the vicinity of Alternative 5.

### **Special Concern Species**

There is 1 state special concern crayfish in the study area. It is the Indiana crayfish (*Orconectes indianensis*). Records indicate its occurrence solely in the vicinity of Alternatives 1 and 2. No records have been reported in the vicinity of Alternatives 3-5.

# INSECTS

## **State Endangered or Threatened Species**

There are 19 state endangered insects reported from the study area. They are two species of the springtails (*Arrhopalites bimus* and *Sinella alata*), four species of the cave beetle (*Pseudanophthalmus emersoni*, *Pseudanophthalmus tenuis*, *Pseudanophthalmus youngii*, and *Pseudanophthalmus shilohensis*), 4 mayflies (*Homoeoneuria ammophila*, *Pseudiron centralis*, *Spinadis wallacei*, and *Raptoheptagenia cruentata*), 2 caddisflies (*Homoplectra doringa* and *Goera stylata*), 1 cave pseudoscorpion (*Apochthonius indianensis*), and 6 butterflies (*Artogeia napi*, *Erynnis persisus*, *Glaucopsyche lygdamus*, *Hesperia ottoe*, *Schinia Indiana*, and *Speyeria idalia*).

In addition, there are 8 state threatened butterfly species (*Atrytonopsis hianna*, *Eosphoropteryx thyatyrorides*, *Erynnis martialis*, *Euchloe olympia*, *Hesperia metea*, *Hyperaeschra tortousa*, and *Lytrosis permagnaria*).

The two springtails were both found in Lawrence County (Alternative 5). *Arrhopalites bimus* is an older record from 1966, while *Sinella alata* is a recent record from 1992.

The four cave beetles in the study area come from older records (1953, 1957 or no date). *Pseudanophthalmus emersoni* was found in vicinity of Alternative 5 (Monroe County); *Pseudanophthalmus tenuis* was found in the vicinity of Alternative 3 (Monroe County); *Pseudanophthalmus youngii* was found in Alternative 5 (Lawrence County), and *Pseudanophthalmus shilohensis* was found in Alternatives 3 and 5 (Monroe County and Lawrence County).

The four mayflies come from older records too. *Homoeoneuria ammophila* was found in Alternatives 1 and 2 (Gibson County) in 1932 and 1936; *Pseudiron centralis* in

Alternatives 3, 4 and 5 (Pike County) in 1975, and in Alternatives 1 and 2 (Gibson County) in 1936; *Spinadis wallacei* in Alternative 5 (Martin County – No Date); and *Raptoheptagenia cruentata* in Alternative 5 (Martin County – No Date).

The two caddisflies come from Monroe County only, and are older records too. *Homoplectra doringa* was recorded in Alternatives 3 and 5 in 1975, while *Goera stylata* was found in Alternatives 3 and 5 in 1947.

The one pseudoscorpion, *Apochthonius indianensis*, was found in Alternative 5 (Lawrence County) in 1976.

Of the 14 species of butterflies in Indiana that are listed as state endangered or threatened, only the regal fritillary has been reported from the study area. It was reported from Monroe County (1891). This species ranges from southern New England westward to southern North Dakota, southward to northern Virginia, Georgia, northeastern Oklahoma, and eastern Colorado. It is basically a prairie species; thus is more common in late summer along railroad tracks and virgin grasslands. It may appear occasionally in wet meadows in woodland areas (Shull, 1987).

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# PART 4

## STATE PLANTS

### State Endangered, Threatened, Rare, and Extirpated Plants

The Indiana Department of Natural Resources (Division of Nature Preserves) is the depository for state listed plants in the State of Indiana. A search of the Indiana Heritage Database (updated May 2002) from the Indiana Department of Natural Resources uncovered 11 recent records (post-1980) of state listed plants in the vicinity of the alternatives. State endangered species were *Bacopa rotundifolia* (Roundleaf waterhyssop), *Carex gravida* (Heavy sedge), *Carya texana* (Black hickory), and *Isoetes melanopoda* (Blackfoot quillwort). State threatened species were *Chrysopsis villosa* (Hairy golden-aster), *Diodia virginiana* (Buttonweed), and *Taxodium distichum* (bald cypress). State rare species were *Cyperus pseudovegetus* (Green flatsedge), *Didiplis diandra* (Water-purslane), *Sagittaria australis* (Longbeak arrowhead), and *Trachelospermum difforme* (Climbing dogbane). A description of these species may be found in the following section.

There are though other possible state listed plants that could be in an alternative(s) since they have been reported in southwestern Indiana. The following list identifies 200 state listed plants from southwestern Indiana (Table I - Part 4). Information provided are the species, status, and whether or not it is found in woods, savannah, prairie, primary (e.g., glades, bluffs, lake shores), cultural (farmland, residential, fallow fields, plantation, restoration lands, mining lands), wetland, stream, and/or open water (e.g., lake and pond) habitats. Since field work has not been conducted as part of this Tier 1 Environmental Impact Statement, the “likelihood” of encountering these state listed endangered, threatened, rare, and extirpated plants in the field is directly related to impacts to the above habitats.

Results from these 200 state listed plants recorded from southwestern Indiana show:

- 1) 60% are fully or partially dependent on forests
- 2) 47% are fully or partially dependent on wetlands (including streams and open water)
- 3) 35% are fully or partially dependent on glades, bluffs or lake shores
- 4) 27% are fully or partially dependent on prairies
- 5) 13% are fully or partially dependent on savannahs

State plants are important, and all efforts to avoid impacts to them should be implemented. A environmentally sound approach would be to avoid habitats that they inhabit as much as possible. From the data available, avoidance of forest and wetland areas would avoid many state listed plants.

In the event that a state listed plant is discovered in Tier 2 studies, the investigator should contact the Indiana Department of Natural Resources (Division of Nature Preserves) in Indianapolis with the species, location and habitat. An on-site visit would be helpful in verifying the specimen.

## **State Endangered Plants**

**Bacopa rotundifolia** (Michx.). Roundleaf water-hyssop. State Endangered. Deam (1940) reported it infrequent in sinkholes in Lawrence, Orange, and Washington Counties, but not seen in sinkholes in other counties where the same habitat occurs. The specimen found in Warrick County was found in the old can near Millersburg. It was very common in the ponds where it was found, although stock had injured it. Recent records (post-1980) are available for this species in the vicinity of Alternatives 1, 5A and 5B.

**Carex grvida** Bailey. Heavy Sedge. State Endangered. Known in Indiana from the prairie area in the westernmost tier of counties where it is found on sandy bur oak ridges and sandy and gravelly railroad embankments. Recent records (post-1980) are available for this species in the vicinity of Alternatives 1, 2A, 2B and 2C.

**Carya texana** Buckl. Black Hickory. State Endangered. This species was not reported by Deam (1940). Mohlenbrock (1986) reports this species from dry woods and bluffs. In Illinois, it is occasional to rare in the south half of Illinois and rare elsewhere. Recent records (post-1980) are available for this species in the vicinity of Alternatives 1, 2A, 2B and 2C.

**Isoetes melanopoda** Gay and Dur. Blackfoot Quillwort. State Endangered. This species was not reported by Deam (1940). Mohlenbrock (1986) reports this species from shallow water of ponds and ditches, and shallow depressions on sandstone. It is local throughout Illinois. Recent record (post-1980) is available for this species in the vicinity of Alternatives 1.

## **State Threatened Plants**

**Chrysopsis villosa** (Pursh.). Hairy golden-aster. Deam (1940) reported it locally common in very sandy soil along roadsides in the counties of Gibson, Knox, Daviess, Sullivan and Vigo. Recent records (post-1980) are available for this species in the vicinity of Alternatives 1, 2A, 2B and 2C.



***Diodia virginiana*** L. Virginia Buttonweed. Deam (1940) does not report this species. A plant survey of the Patoka River bottoms found this species in 1993. Recent records (post-1980) are available for this species in the vicinity of Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5C.

***Taxodium distichum*** (L.). Bald cypress. Deam (1940) reported this species from the counties of Posey, Vanderburgh, Warrick and Knox. It is a tree of bottomland swamps. Recent records (post-1980) are available for this species in the vicinity of Alternatives 1, 2A, 2B and 2C.

## **State Rare Plants**

***Cyperus pseudovegetus*** Steud. Green Flatsedge. Deam (1940) reported this species as infrequent in ditches and swamps in Point Township of Posey County. It has been found also in Gibson, Pike and Jefferson Counties. It is not an uncommon plant in these counties. Recent records (post-1980) are available for this species in the vicinity of Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5B.

***Didiplis diandra*** (Nutt.) Wood. Water Purslane. Deam (1940) reported it as very rare. It is found in stagnant water in ponds. Recent records (post-1980) are available for this species in the vicinity of Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5B.

***Sagittaria australis*** (J. G. Smith) Small. Longbeak arrowhead. Deam (1940) reported this species is a southern species which is known only from Perry County. It is found on muddy shores. Recent records (post-1980) are available for this species in the vicinity of Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5B.

***Trachelospermum difforme*** (Walt.). Climbing Dogbane. Deam (1940) reported this climbing vine, herbaceous in Indiana, growing in compact, clay soil in low, open woods in southwestern Indiana. The flowers are yellow and very fragrant. Recent records (post-1980) are available for this species in the vicinity of Alternatives 3A, 3B, 3C, 4A, 4B, 4C, 5A and 5B.

## **Other Plants with Older Records in the Vicinity of the Alternatives**

Other state listed plants with records between 1917 to 1941 showed the following species:

**State Endangered** – *Cyperus acuminatus* (Alternatives 2A, 2B, 2C), *Hypericum adpressum* (Alternatives 1, 2A, 2B, 2C), *Lithospermum incisum* (Alternatives 5A, 5B), *Magnolia acuminata* (Alternatives 5A, 5B), and *Panicum bicknellii* (Alternatives 5A, 5B).

**State Threatened** – *Androsace occidentalis* (Alternatives 2A, 2B, 2C), *Gentiana puberulenta* (Alternatives 1, 2A, 2B, 2C), *Oraobanche ludoviciana* (Alternatives 1, 2A, 2B, 2C), *Panicum yadkinense* (Alternatives 5A, 5B), *Penstemon canescens* (Alternatives 5A, 5B), *Sparganium androcladum* (Alternatives 5A, 5B), and *Strophostyles leiosperma* (Alternatives 1, 2A, 2B, 2C).

**State Rare** – *Catalpa speciosa* (Alternative 3A), *Cyperus pseudovegetus* (Alternative 1), *Prenanthes aspera* (Alternatives 1, 2A, 2B, 2C), *Rudbeckia fulgida* (Alternatives 3A, 3B, 3C, 4A, 4B, 4C), and *Trichostema dichotumum* (Alternative 1).

**State Extirpated** – *Cabomba caroliniana* (Alternatives 5A, 5B), *Callirhoe triangulata* (Alternative 1), *Conza canadensis* var *pusilla* (Alternatives 1, 2A, 2B, 2C), *Panicum mattamuskeetense* (Alternatives 5A, 5B), and *Pteridium aquilinum* var *pseudocarudatum* (Alternative 1).

Reference: Deam, Charles C. 1940. Flora of Indiana. Wm. B. Burford Printing Company, Contractor for the State Printing and Binding. State of Indiana Department of Conservation. Published by the Department of Conservation, Division of Forestry, Indianapolis, Indiana. 1236 pp.

Table I – Part 4. Endangered and Threatened Status, Rankings and Habitat for State Listed Species in I-69 Study Area

Species name	Common name	Federal status	State status	G Rank	S Rank	Woods	Savanna	Prairie	Primary	Cultural	Wetland	Stream	Lakes/ Ponds
ACALYPHA DEAMII	MERCURY	**	ST	G5?	S2	✓							
ACONITUM UNCINATUM	BLUE MONKSHOOD	**	SE	G4	S1	✓							
ANDROSACE OCCIDENTALIS	WESTERN ROCKJASMINE	**	ST	G5	S2	✓		✓	B/G	✓			
ANEMONE CAROLINIANA	CAROLINA ANEMONE	**	SX	G5	SX		✓	✓	B/G	✓			
ARENARIA STRICTA	MICHAUX'S STITCHWORT	**	SR	G5	S2				not determined				
ARMORACIA AQUATICA	LAKE CRESS	**	SE	G4?	S1						✓	✓	✓
ASPLENIUM BRADLEYI	BRADLEY'S SPLEENWORT	**	SE	G4	S1				B				
ASPLENIUM MONTANUM	MOUNTAIN SPLEENWORT	**	SE	G5	S1				B				
ASPLENIUM RUTA-MURARIA	WALLRUE SPLEENWORT	**	ST	G5	S2				B				
ASTER OBLONGIFOLIUS	AROMATIC ASTER	**	SR	G5	S2	✓		✓	B/G				
AZOLLA CAROLINIANA	CAROLINA MOSQUITO-FERN	**	ST	G5	S2								✓
BACOPA ROTUNDIFOLIA	ROUNDLEAF WATER-HYSSOP	**	SE	G5	S1	✓					✓	✓	✓
BAPTISIA AUSTRALIS	WILD FALSE INDIGO	**	ST	G5	S2	✓							
BUCHNERA AMERICANA	BLUEHEARTS	**	SE	G5?	S1		✓	✓	G		✓		
BUMELIA LYCIOIDES	BUCKTHORN	**	SE	G5	S1	✓			B		✓		
CABOMBA CAROLINIANA	CAROLINA FANWORT	**	SX	G5	SX						✓	✓	✓
CALLIRHOE TRIANGULATA	CLUSTERED POPPY-MALLOW	**	SX	G3G4	SX	✓		✓	G				
CALYOCARPUM LYONII	CUP-SEED	**	ST	G5	S2	✓					✓		
CAREX ATLANTICA SSP ATLANTICA	ATLANTIC SEDGE	**	ST	G5T4	S2	✓					✓		
CAREX ATLANTICA SSP CAPILLACEA	HOWE SEDGE	**	SE	G5T5?	S1	✓					✓		
CAREX BUSHII	BUSH'S SEDGE	**	SE	G4	S1	✓		✓	B/G	✓	✓		
CAREX DECOMPOSITA	CYPRESS-KNEE SEDGE	**	ST	G4	S2						✓		
CAREX EBURNEA	EBONY SEDGE	**	SR	G5	S2	✓			B/G/S				
CAREX GIGANTEA	LARGE SEDGE	**	SE	G4	S1	✓					✓		
CAREX GRAVIDA	HEAVY SEDGE	**	SE	G5	S1		✓	✓		✓			
CAREX LUPULIFORMIS	FALSE HOP SEDGE	**	SR	G3?	S2	✓					✓		
CAREX PEDUNCULATA	LONGTALK SEDGE	**	SR	G5	S2	✓							
CAREX SOCIALIS	SOCIAL SEDGE	**	SR	G3	S2	✓							
CAREX SPARGANIODES VAR CEPHALOIDEA	THINLEAF SEDGE	**	ST	G5	S2	✓		✓			✓		
CAREX STRAMINEA	STRAW SEDGE	**	ST	G5	S2		✓				✓		
CARYA PALLIDA	SAND HICKORY	**	ST	G5	S2	✓							
CARYA TEXANA	BLACK HICKORY	**	SE	G4	S1	✓	✓		B/G				
CATALPA SPECIOSA	NORTHERN CATALPA	**	SR	GU	S2	✓				✓			
CHAMAELIRIUM LUTEUM	DEVIL'S-BIT	**	SE	G5	S1	✓							
CHEILANTHES LANOSA	HAIRY LIPFERN	**	SR	G5	S2	✓			B/G				
CHRYSOOPSIS VILLOSA	HAIRY GOLDEN-ASTER	**	ST	G5	S2			✓					
CIMICIFUGA RUBIFOLIA	APPALACHIAN BUGBANE	**	SE	G3	S1	✓							
CIRSIMUM CAROLINIANUM	CAROLINA THISTLE	**	SR	G5	S2	✓			B		✓		
CLEMATIS PITCHERI	PITCHER LEATHER FLOWER	**	SR	G4G5	S2	✓			B				
CLADRASTIS LUTEA	YELLOWWOOD	**	ST	G4	S2				not determined				
CONYZA CANADENSIS VAR PUSILLA	FLEABANE	**	SX	G5T5	SX			✓	G	✓			
CORNUS AMOMUM SSP AMOMUM	SILKY DOGWOOD	**	SE	G5T?	S1	✓				✓	✓		
CRATAEGUS CHRYSOCARPA	FINEBERRY HAWTHORN	**	SE	G5	S1				not determined				

Table I – Part 4. Endangered and Threatened Status, Rankings and Habitat for State Listed Species in I-69 Study Area

Species name	Common name	Federal status	State status	G Rank	S Rank	Woods	Savanna	Prairie	Primary	Cultural	Wetland	Stream	Lakes/ Ponds
CRATAEGUS GRANDIS	GRAND HAWTHORN	**	SE	G3G5Q	S1				not determined	not determined			
CRATAEGUS INTRICATA	A HAWTHORN	**	SR	G5	S2				B	✓			
CRATAEGUS SUCCULENTA	FLESHY HAWTHORN	**	SR	G5	S2	✓							
CRATAEGUS VIRIDIS	GREEN HAWTHORN	**	ST	G5	S2	✓							
CROTONOPSIS ELLIPTICA	ELLIPTICAL RUSHFOIL	**	SE	G5	S1	✓	✓		B/G	✓			
CUSCUTA CUSPIDATA	CUSP DODDER	**	SX	G5	SX			✓			✓		
CYPHERUS PSEUDOVEGETUS	GREEN FLATSEGE	**	SR	G5	S2	✓		✓			✓		
CYPRIPEDIUM CALCEOLUS VAR PARVIFLORUS	SMALL YELLOW LADY'S SLIPPER	**	SR	G5	S2								
DESCHAMPSIA CESPITOSA	TUFTED HAIRGRASS	**	SR	G5	S2	✓		✓			✓		
DESMODIUM HUMIFUSUM	TICK TREFOIL	**	SE	G1G2Q	S1								
DICLIPTERA BRACHIATA	WILD MUDWORT	**	SE	G5	S1	✓					✓		
DIDIPLIS DIANDRA	WATER-PURSLANE	**	SR	G5	S2						✓		✓
DIERVILLA LONICERA	NORTHERN BUSH-HONEYSUCKLE	**	SR	G5	S2	✓							
DIODIA VIRGINIANA	BUTTONWEED	**	ST	G5	S2	✓				✓			
DODECATHEON FRENCHII	FRENCH'S SHOOTINGSTAR	**	SR	G3	S2				B				
ECHINODORUS CORDIFOLIUS	CREeping BUR-HEAD	**	SX	G5	SX						✓		
ELEOCHARIS WOLFII	WOLF SPIKERUSH	**	SR	G4G5	S2			✓		✓			
ERYSIMUM CAPITATUM	PRAIRIE-ROCKET WALLFLOWER	**	ST	G5	S2				B/G				
EUPATORIUM ALBUM	WHITE THOROUGHWORT	**	SE	G5	S1	✓	✓						
EUPATORIUM INCARNATUM	PINK THOROUGHWORT	**	ST	G5	S2	✓			B		✓		
EUPHORBIA OBTUSATA	BLUNTLEAF SPURGE	**	SX	G5	SX	✓				✓			
EUPHORBIA SERPENS	MATTED BROOMSPURGE	**	SX	G5	SX						✓		
FESTUCA PARADOXA	CLUSTER FESCUE	**	SE	G5	S1	✓		✓	B				
FIMBRISTYLIS ANNUA		**	SE	G5	S1						✓		
FIMBRISTYLIS PUBERULA	CAROLINA FIMBRY	**	SE	G5	S1	✓		✓			✓		
GAURA FILIPES	SLENDER-STALKED GAURA	**	ST	G5	S2	✓							
GENTIANA ALBA	YELLOW GENTIAN	**	SR	G4	S2	✓	✓		G				
GENTIANA PUBERULENTA	DOWNY GENTIAN	**	ST	G4G5	S2		✓	✓	G				
GLEDITSIA AQUATICA	WATER-LOCUST	**	SE	G5	S1	✓					✓		
GLYCERIA ACUTIFLORA	SHARP-SCALED MANNA-GRASS	**	SE	G5	S1						✓	✓	✓
GONOLOBUS OBLIQUUS	ANGLE POD	**	SR	G4?	S2	✓			G				
GYMNOPOGON AMBIGUUS	BROADLEAF BEARDGRASS	**	SX	G4	SX						✓		
HELIOTROPIMUM TENELLUM	SLENDER HELIOTROPE	**	ST	G5	S2			✓	B/G				
HEXALECTRIS SPICATA	CRESTED CORALROOT	**	SR	G4?	S2	✓	✓	✓	B/G				
HIBISCUS LASIOCARPUS	HAIRY-FRUITED HIBISCUS	**	SE	G4	S1	✓					✓		
HOTTONTIA INFLATA	FEATHERFOIL	**	ST	G4	S2						✓		
HOUSTONIA NIGRICANS	NARROWLEAF SUMMER BLUEETS	**	SR	G5	S2			✓	B/G				
HYMENOPAPPUS SCABIOSAEUS	CAROLINA WOLLYWHITE	**	SE	G4G5	S1			✓	B/G	✓			
HYPERICUM ADPRESSUM	CREeping ST. JOHN'S-WORT	**	SE	G2G3	S1			✓			✓		
HYPERICUM DENTICULATUM	COPPERY ST. JOHN'S-WORT	**	ST	G5	S2	✓							
HYPERICUM DOLABRIFORME	STRAGGLING ST. JOHN'S-WORT	**	SR	G4	S2				G				
HYPERICUM PYRAMIDATUM	GREAT ST. JOHN'S WORT	**	SE	G4	S1	✓				✓			
IREFINE RHIZOMATOSA	EASTERN BLOODLEAF	**	SR	G5	S2	✓					✓		

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Species name	Common name	Federal status	State status	G Rank	S Rank	Woods	Savanna	Prairie	Primary	Cultural	Wetland	Stream	Lakes/ Ponds
ISOETES ENGELMANNII	APPALACHIAN QUILLWORT	**	SE	G4	S1						✓		✓
ISOETES MELANOPODA	BLACKFOOT QUILLWORT	**	SE	G5	S1						✓		✓
ITEA VIRGINICA	VIRGINIA WILLOW	**	SE	G4	S1	✓					✓		
JUGLANS CINEREA	BUTTERNUT	**	WL	G3G4	S3	✓				✓			
JUNCUS ARTICULATUS	JOINTED RUSH	**	SE	G5	S1				LS		✓	✓	
JUNCUS SECUNDUS	SECOND RUSH	**	SE	G5?	S1			✓	B/G	✓			
KRIGIA OPPOSITIFOLIA	DWARF DANDELION	**	ST	G7	S2			✓	G	✓	✓		
LECHEA RACEMULOSA	ILLINOIS PINWEED	**	SE	G5	S1				not determined				
LEMNA MINIMA	LEAST DUCKWEED	**	SE	G7	S1						✓	✓	✓
LEPTOCHLOA PANICOIDES	AMAZON SPRANGLE-TOP	**	SE	G3G5	S1						✓		
LESPEDEZA STUEVEI	TALL BUSH-CLOVER	**	SX	G4?	SX	✓	✓	✓	G	✓			
LESQUERELLA GLOBOSA	LESQUEREUX'S MUSTARD	C	SE	G2	S1	✓			B			✓	
LIATRIS PYCNOSTACHYA	CATTAIL GAY-FEATHER	**	ST	G5	S2			✓	B/G	✓			
LILIUM CANADENSE	CANADA LILY	**	SR	G5	S2	✓					✓		
LINUM SULCATUM	GROOVED YELLOW FLAX	**	SR	G5	S2			✓	G				
LITHOSPERMUM INCISUM	NARROW-LEAVED PUCCOON	**	SE	G5	S1		✓	✓	G	✓			
LUDWIGIA DECURRENS	PRIMROSE WILLOW	**	SR	G5	S2						✓	✓	✓
LUDWIGIA GLANDULOSA	CYLINDRIC-FRUITED SEEDBOX	**	ST	G5	S2						✓	✓	✓
LYCOPodium DENDROIDEUM	TREELIKE CLUBMOSS	**	SE	G5	S1	✓			B		✓		
MAGNOLIA ACUMINATA	CUCUMBER MAGNOLIA	**	SE	G5	S1	✓				✓			
MAGNOLIA TRIPETALA	UMBRELLA MAGNOLIA	**	SE	G5	S1	✓				✓		✓	
MALAXIS UNIFOLIA	GREEN ADDER'S-MOUTH	**	SE	G5	S1	✓							
MATTEUCCIA STRUTHIOPTERIS	OSTRICH FERN	**	SR	G5	S2	✓				✓			
MELANTHIUM VIRGINICUM	VIRGINIA BUNCHFLOWER	**	SE	G5	S1	✓		✓	B	✓	✓		
MELOTHRIA PENDULA	CREeping CUCUMBER	**	SX	G4	SX	✓				✓	✓		
MIKANIA SCANDENS	CLIMBING HEMPWEED	**	SE	G5	S1					✓	✓		
MONARDA BRADBURIANA	EASTERN BEE-BALM	**	SE	G5	S1	✓			G	✓			
NAJAS GRACILLIMA	THREAD-LIKE NAIAD	**	SE	G5?	S1						✓		✓
NOTHOSCORDUM BIVALVE	CROW-POISON	**	SR	G4	S2	✓			B/G		✓		
OENOTHERA PERENNIS	SMALL SUNDROPS	**	ST	G5	S2			✓		✓			
ONOSMODIUM HISPIDISSIMUM	SHAGGY FALSE-GROMWELL	**	SE	G4	S1	✓	✓	✓	G	✓			
OPHIOGLOSSUM ENGELMANNII	LIMESTONE ADDER'S-TONGUE	**	SR	G5	S2			✓					
OROBANCHE LUDOVICIANA	LOUISIANA BROOMRAPE	**	ST	G5	S2	✓			B				
ORYZOPSIS RACEMOSA	BLACK-FRUIT MOUNTAIN-RICEGRASS	**	ST	G5	S2	✓							
OXALIS ILLINOENSIS	ILLINOIS WOODSORREL	**	SR	G2G3Q	S2	✓							
OXYDENDRUM ARBOREUM	SOURWOOD	**	ST	G5	S2	✓							
PACHYSANDRA PROCUMBENS	ALLEGHENY SPURGE	**	SE	G4G5	S1	✓				✓			
PANICUM BICKNELLII	A PANIC-GRASS	**	SE	GUQ	S1			✓			✓		
PANICUM MATTAMUSKEETENSE	A PANIC-GRASS	**	SX	G7	SX	✓							
PANICUM SCOPARIUM	BROOM PANIC-GRASS	**	SE	G5	S1		✓	✓	B/G	✓	✓		
PANICUM VERRUCOSUM	BLOOD WITCHGRASS	**	SR	G5	S2						✓		
PANICUM YADKINENSE	A PANIC-GRASS	**	ST	G7	S2	✓					✓		
PASSIFLORA INCARNATA	PURPLE PASSION-FLOWER	**	SR	G5	S2	✓				✓			

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Species name	Common name	Federal status	State status	G Rank	S Rank	Woods	Savanna	Prairie	Primary	Cultural	Wetland	Stream	Lakes/ Ponds
PENSTEMON CANESCENS	GRAY BEARDEDTONGUE	**	ST	G4	S2	✓							
PENSTEMON TUBAEFLORUS	TUBE PENSTEMON	**	SX	G5	SX	✓	✓	✓	G				
PERIDERIDIA AMERICANA	EASTERN EULOPHUS	**	SE	G4	S1	✓			B/G				
PHACELIA RANUNCULACEA	BLUE SCORPION-WEED	**	SE	G4	S1	✓					✓		
PHLOX AMPLIFOLIA	LARGE-LEAVED PHLOX	**	ST	G3G5	S2	✓							
PINUS STROBUS	EASTERN WHITE PINE	**	SR	G5	S2	✓				✓			
PLANTAGO CORDATA	HEART-LEAVED PLANTAIN	**	SE	G4	S1	✓					✓	✓	
PLATANHERA FLAVA VAR FLAVA	SOUTHERN REIN ORCHID	**	SE	G4T4Q	S1	✓		✓					
PLATANHERA PSYCODES	SMALL PURPLE-FRINGE ORCHIS	**	SR	G5	S2	✓		✓					
POA PALUDIGENA	BOG BLUEGRASS	**	WL	G3	S3						✓		
POLYPODIUM POLYPODIOIDES	RESURRECTION FERN	**	SR	G5	S2	✓			B				
POLYTAENIA NUTTALLII	PRAIRIE PARSLEY	**	SE	G5	S1		✓	✓	G				
POTAMOGETON PULCHER	SPOTTED PONDWEED	**	SE	G5	S1								
POTAMOGETON PUSILLUS	SLENDER PONDWEED	**	SR	G5	S2	✓					✓	✓	✓
PRENANTHES ASPERA	ROUGH RATTLESNAKE-ROOT	**	SR	G4G	S2	✓	✓	✓	G				
PSORALEA TENUIFLORA	FEW-FLOWERED SCURF-PEA	**	SX	G5	SX	✓			G				
PTERIDIUM AQUILINUM VAR PSEUDOCAUDATUM	BRACKEN FERN	**	SX	G5T5	SX	✓				✓			
RANUNCULUS LAXICAULIS	MISSISSIPPI BUTTERCUP	**	SE	G5?	S1	✓		✓			✓		
RANUNCULUS PUSILLUS	PURSH BUTTERCUP	**	SE	G5	S1	✓					✓		✓
RHEXIA MARIANA VAR MARIANA	MARYLAND MEADOW BEAUTY	**	SE	G5T5	S1	✓		✓			✓		
RHYNCHOSPORA CORNICULATA VAR INTERIOR	SHORT-BRISTLE HORNED-RUSH	**	ST	G5T7	S2	✓					✓		
RUBUS ALUMINUS	A BRAMBLE	**	SX	G5	SX								
RUBUS CENTRALIS	ILLINOIS BLACKBERRY	**	SE	G2GQ	S1	✓	✓		B/G				
RUBUS DEAMII	DEAM DEWBERRY	**	SX	G4?	SX				not determined				
RUBUS ENSLENI	SOUTHERN DEWBERRY	**	SE	G4G5	S1	✓	✓		B/G				
RUBUS IMPAR	A BRAMBLE	**	SX	G1G2	SX				not determined				
RUBUS ODORATUS	PURPLE FLOWERING RASPBERRY	**	ST	G5	S2					✓			
RUDBECKIA FULGIDA VAR FULGIDA	ORANGE CONEFLOWER	**	SR	G5T7	S2	✓	✓	✓	G		✓		
RUDBECKIA FULGIDA VAR UMBROSA	CONEFLOWER	**	SE	G5T7	S1	✓							
SABATIA CAMPANULATA	SLENDER MARSH PINK	**	SX	G5	SX						✓		
SAGITTARIA AUSTRALIS	LONGBEAK ARROWHEAD	**	SR	G5	S2						✓		✓
SANGUISORBA CANADENSIS	CANADA BURNET	**	SE	G5	S1			✓			✓		
SANICULA SMALLII	SMALL'S SNAKEROOT	**	SR	G5	S2				not determined				
SAXIFRAGA VIRGINIENSIS	VIRGINIA SAXIFRAGE	**	SR	G5	S2	✓			B/G				
SCIRPUS PURSHIANUS	WEAKSTALK BULRUSH	**	SE	G4G5	S1						✓		
SCUTELLARIA PARVULA VAR AUSTRALIS	SOUTHERN SKULLCAP	**	SR	G4T7	S2	✓		✓					
SCUTELLARIA PARVULA VAR PARVULA	SMALL SKULLCAP	**	SX	G4T7	SX	✓	✓	✓	B/G				
SCUTELLARIA SAXATILIS	ROCK SKULLCAP	**	SE	G4?	S1	✓				✓			
SEDUM TELEPHIOIDES	ALLEGHENY STONECROP	**	ST	G4	S2				B				
SELAGINELLA APODA	MEADOW SPIKE-MOSS	**	SE	G5	S1	✓			B		✓		
SENNA OBTUSIFOLIA	BLUNT-LEAF SENNA	**	SR	G5	S2								
SETARIA GENICULATA	BRISTLY FOXTAIL	**	SE	G5	S1	✓		✓	G				
SILENE OVATA	OVATE CATCHFLY	**	SE	G3	S1	✓							

Table I – Part 4. Endangered and Threatened Status, Rankings and Habitat for State Listed Species in I-69 Study Area

Species name	Common name	Federal status	State status	G Rank	S Rank	Woods	Savanna	Prairie	Primary	Cultural	Wetland	Stream	Lakes/ Ponds
SILENE REGIA	ROYAL CATCHFLY	**	ST	G3	S2	✓	✓	✓					
SOLIDAGO BUCKLEYI	BUCKLEY'S GOLDENROD	**	SE	G4	S1	✓			B				
SPARGANIUM ANDROCLADUM	BRANCHING BUR-REED	**	ST	G4G5	S2						✓		✓
SPIGELIA MARILANDICA	WOODLAND PINKROOT	**	SE	G5	S1	✓					✓		
SPIRANTHES OCHROLEUCA	YELLOW NODDING LADIESTRESSES	**	ST	G4	S2				not determined				
SPIRANTHES VERNALIS	GRASSLEAF LADIES'-TRESSES	**	SR	G5	S2	✓		✓		✓			
STACHYS CLINGMANII	CLINGMAN HEDGE-NETTLE	**	SE	G3	S1	✓							
STENANTHIUM GRAMINEUM	EASTERN FEATHERBELLS	**	SE	G4G5	S1	✓							
STROPHOSTYLES LEIOSPERMA	SLICK-SEED WILD-BEAN	**	ST	G5	S2	✓		✓	G	✓			
STYRAX GRANDIFOLIUS	LARGE-LEAF SNOWBELL	**	SE	G5	S1	✓							
TAXODIUM DISTICHUM	BALD CYPRESS	**	ST	G5	S2	✓				✓			
TAXUS CANADENSIS	AMERICAN YEW	**	ST	G5	S2	✓				✓			
THALICTRUM PUBESCENS	TALL MEADOWRUPE	**	ST	G5	S2					✓			
TRACHELOSPERMUM DIFFORME	CLIMBING DOGBANE	**	SR	G4G5	S2	✓					✓		
TRAGIA CORDATA	HEART-LEAVED NOSEBURN	**	SR	G4	S2	✓			B/G				
TRAUTVETTERIA CAROLINIENSIS	CAROLINA TASSEL-RUE	**	SX	G5	SX	✓		✓	B		✓		
TRICHOMANES BOSCHIANUM	FILMY FERN	**	SE	G4	S1				B				
TRICHOSTEMA DICHOTOMUM	FORKED BLUECURL	**	SR	G5	S2	✓	✓		G	✓			
TRIFOLIUM REFLEXUM VAR GLABRUM	BUFFALO CLOVER	**	SE	G5T1T3	S1	✓				✓			
VERBESINA VIRGINICA	WHITE CROWNBEARD	**	SE	G5?	S1	✓	✓		B		✓		
VIBURNUM MOLLE	SOFTLEAF ARROW-WOOD	**	SR	G5	S2	✓			B				
VITIS PALMATA	CATBIRD GRAPE	**	SR	G4	S2	✓				✓			
VITTARIA APPALACHIANA	APPALACHIAN VITTARIA	**	SR	G4	S2	✓							
WALDSTEINIA FRAGARIOIDES	BARREN STRAWBERRY	**	SR	G5	S2	✓			B				
WISTERIA MACROSTACHYA	KENTUCKY WISTERIA	**	SR	G5	S2	✓					✓	✓	
WOODWARDIA AREOLATA	NETTED CHAINFERN	**	SR	G5	S2				B		✓		
ZANNICHELLIA PALUSTRIS	HORNED PONDWEED	**	SE	G5	S1						✓		✓
ZIZIA APTEA	GOLDEN ALEXANDERS	**	SR	G5	S2	✓		✓	B/G	✓			

Federal Listing Status	State Listing Status	Global Rank	State Rank	Habitat
LE - Listed Endangered LT - Listed Threatened LTLNL - Listed Threatened/Not Listed C - Candidate taxon, ready for proposal	SE - State Endangered ST - State Threatened SR - State Rare SG - State Significant SSC - State Special Concern SX - State Extirpated SRE - State Reintroduced	G1 - Extremely Rare G2 - Rare G3 - Uncommon G4 - Many Occurrences G5 - Very Common GU - Uncertain  T1 - Subspecies Extremely Rare T2 - Subspecies Rare T3 - Subspecies Uncommon T4 - Subspecies Many Occurrences T5 - Subspecies Very Common	S1 - Extremely Low S2 - Rare S3 - Uncommon S4 - Many Occurrences S5 - Very Common SX - Extirpated SZN - Widely Dispersed/Migratory or Non-Breeding SR - Reported but without persuasive documentation SREN - Reported Falsely in Literature/Migratory or Non-Breeding	B - Bluff G - Glade LS - Lake Shore S1B - Extremely Rare/Breeding S2B - Rare/Breeding S3B - Uncommon/Breeding S4B - Many Occurrences/Breeding S5B - Very Common/Breeding

Source for status and rank: Indiana Department of Natural Resources, Division of Nature Preserves <http://www.state.in.us/dnr/naturepreserves/plant.html>

Source for candidate status: Endangered and Threatened Wildlife and Plants: Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions; Annual Description of Progress on Listing Actions. 67 FR 40657-40679; June 13, 2002

Primary source for habitat classifications: Iverson, L.R., D. Ketzner, and J. Karnes. 1999. Illinois Plant Information Network. Database at <http://www.fs.fed.us/ne/delaware/lpin.html>. Illinois Natural History Survey and USDA Forest Service.

Note: ? denotes an unranked status.





# **PART 5**

## **Wetland, Habitat and Trophic Response Guilds for Mammals, Birds, Reptiles, Amphibians, and Fishes in Indiana**

Wetland, habitat and trophic response guilds were developed for all reasonable resident and migrant species occurring in Indiana based on a literature review and field experience. Rankings were coded so as to emphasize wildlife species and their sensitivity or tolerance to anthropogenic (man-made) disturbances in aquatic and terrestrial habitats. This database provides valuable information about the habitat, feeding, movement, status and sensitivity for adaptability of each species.

The categories used are shown in Table 1. They are: 1) wetland or aquatic dependency; 2) habitat specificity; 3) trophic level, 4) seasonality (birds only), and 5) species status. In addition, birds sensitive to forest and grassland (prairie) fragmentation, and tolerance levels for fishes are included for reference. Ranking of species in standardized guilds provides a way to compare structural and functional changes in wildlife communities affected by various types of environmental impacts.

This database of mammals, birds, reptiles, amphibians, and fishes occurring in Indiana includes a sample size of 606 species based on guild rankings (Tables 2-6). Results show about 47% of 57 mammals, 62% of 282 birds, 43 % of 53 reptiles, 100 % of 38 amphibians, and 100 % of 176 fishes could be categorized as being partially or fully dependent upon wetlands and/or associated aquatic habitats.

Of these 606 vertebrates, approximately 73% are fully or partially wetland dependent. In addition, 93 of 120 (78%) of the TES (including watch list species) are wetland dependent. Wetlands make up only 4-5% of the surface area of Indiana and such high occurrences of TES species for wetlands shows the value and importance of wetland habitats to Indiana's biota. The remaining 27 TES species may be categorized as grassland species (14), forest species (10), cave species (2), or reintroduced (1).

Reference: Brooks, R. P., and M. J. Croonquist. 1990. Wetland, habitat, and trophic response guilds for wildlife species in Pennsylvania. J. Pa. Acad. Sci. 64: 93-102.



**Table 1. Ranking scores for response guilds of wildlife communities.**

	Code
<b>1. WETLAND DEPENDENCY</b>	
obligate species (found >99% in wetlands)	5
facultative wet (57-99%, generally found in or near wetlands)	3
facultative (34-66%, occurs frequently, but not essential)	1
facultative dry (1-33%, occasional or no use)	0
upland (>99% in uplands)	0
<b>2. HABITAT SPECIFICITY</b>	
alpha species -- stenotypic, specialist (e.g., large tree cavity nester, clear water)	5
gamma species -- landscape dependent (e.g., undisturbed forest in Indiana, affected by changes in land use, wide-ranging)	3
beta species -- generalist, edge, disturbance	1
<b>3. TROPHIC LEVEL</b>	
carnivore, specialist (restricted diet)	5
carnivore, generalist	4
herbivore, specialist (e.g., nuts, nectar)	3
herbivore, generalist	2
omnivore (exists on either plants or animals)	1
<b>4. SEASONALITY (birds only)</b>	
breeding season resident/neotropical migrant	5
short-distance migrant	4
year round resident	3
non-breeding season resident only	2
migratory transient	1
occasional	0
<b>5. SPECIES STATUS</b>	
endangered, threatened, special concern, watch list, and endemic	5
commercial, recreational value	3
other native species	1
exotics	0



**Table 2. Response guilds of Indiana mammals.**

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Status
<i>Didelphis virginiana</i> Kerr, opossum	1	1	1	3
<i>Blarina brevicauda</i> (Say), short-tailed shrew	1	3	4	1
<i>Cryptotis parva</i> (Say), least shrew	1	3	4	1
<i>Sorex cinereus</i> Kerr, masked shrew	1	1	4	1
<i>S. fumeus</i> Miller, smoky shrew	1	3	4	5
<i>S. hoyi</i> Baird, pygmy shrew	1	3	4	5
<i>S. longirostris</i> Bachman, southeastern shrew	1	1	4	1
<i>Condylura cristata</i> (Rafinesque), star-nosed mole	5	5	4	5
<i>Scalopus aquaticus</i> (Linnaeus), eastern mole	0	1	4	1
<i>Eptesicus fuscus</i> (Beauvois), big brown bat	1	3	5	1
<i>Lasionycteris noctivagans</i> (Le Conte), silver-haired bat	1	3	5	1
<i>Lasiurus borealis</i> (Muller), red bat	1	3	5	1
<i>L. cinereus</i> (Beauvois), hoary bat	1	3	5	1
<i>Myotis austroriparius</i> (Rhoads), southeastern bat	1	3	5	5
<i>M. grisescens</i> (Howell), gray myotis	3	5	5	5
<i>M. lucifugus</i> (Le Conte), little brown myotis	1	3	5	1
<i>M. septentrionalis</i> Trouessart, Northern myotis	1	5	5	1
<i>M. sodalis</i> Miller and Allen, Indiana myotis	1	5	5	5
<i>Nycticeius humeralis</i> (Rafinesque), evening bat	1	5	5	5
<i>Pipistrellus subflavus</i> (Cuvier), eastern pipistrelle	1	3	5	1
<i>Corynorhinus rafinesquii</i> (Lesson), Rafinesque's big-eared bat	0	3	5	5
<i>Sylvilagus aquaticus</i> (Bachman), swamp rabbit	3	3	2	5
<i>S. floridanus</i> (Allen), cottontail rabbit	0	1	2	3
<i>Glaucomys volans</i> (Linnaeus), southern flying squirrel	0	5	3	1
<i>Marmota monax</i> (Linnaeus), woodchuck	0	3	3	3

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Status
<i>Sciurus carolinensis</i> Gmelin, gray squirrel	0	5	3	3
<i>S. niger</i> Linnaeus, fox squirrel	0	5	3	3
<i>Spermophilus franklinii</i> (Sabine), Franklin's ground squirrel	0	5	1	5
<i>S. tridecemlineatus</i> (Mitchill), thirteen-lined ground squirrel	0	3	1	1
<i>Tamias striatus</i> (Linnaeus), eastern chipmunk	0	1	1	1
<i>Tamiasciurus hudsonicus</i> (Erxleben), red squirrel	0	5	3	1
<i>Geomys bursarius</i> (Shaw), plains pocket gopher	0	3	3 (Grass)	1
<i>Castor canadensis</i> Kuhl, beaver	5	5	3	3
<i>Neotoma magister</i> (Baird), Allegheny woodrat	0	5	2	5
<i>Peromyscus leucopus</i> (Rafinesque), white-footed mouse	0	1	1	1
<i>P. maniculatus</i> (Wagner), deer mouse	0	3	1	1
<i>Reithrodontomys megalotis</i> (Baird), western harvest mouse	0	3	1	5
<i>Microtus ochrogaster</i> (Wagner), prairie vole	0	3	2	1
<i>M. pennsylvanicus</i> (Ord), meadow vole	1	3	2	1
<i>M. pinetorum</i> (Le Conte), woodland vole	0	1	2	1
<i>Ondatra zibethicus</i> (Linnaeus), muskrat	5	3	2	3
<i>Synaptomys cooperi</i> Baird, southern bog lemming	0	3	2	1
<i>Mus musculus</i> Linnaeus, house mouse	0	3	1	0
<i>Rattus norvegicus</i> (Berkenhout), Norway rat	0	1	1	0
<i>Zapus hudsonius</i> (Zimmermann), meadow jumping mouse	1	1	1	1
<i>Canis latrans</i> Say, coyote	0	1	1	3
<i>Urocyon cinereoargenteus</i> (Schreber), gray fox	0	3	1	3
<i>Vulpes vulpes</i> (Linnaeus), red fox	0	1	1	3
<i>Procyon lotor</i> (Linnaeus), raccoon	3	1	1	3
<i>Lutra canadensis</i> (Schreber), river otter	5	5	5	5
<i>Mustela frenata</i> Lichtenstein, long-tailed weasel	0	1	4	3
<i>M. nivalis</i> (Linnaeus), least weasel	0	3	4	5

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Status
<i>M. vison</i> Schreber, mink	5	3	4	3
<i>Taxidea taxus</i> (Schreber), badger	0	3	4	5
<i>Mephitis mephitis</i> (Schreber), striped skunk	0	1	1	3
<i>Lynx rufus</i> (Schreber), bobcat	0	3	4	5
<i>Odocoileus virginianus</i> (Zimmermann), white-tailed deer	0	1	2	3

<sup>a</sup>Wet-dep = Wetland dependence

<sup>b</sup>Hab-spec = Habitat specificity

<sup>c</sup>Trophic = Trophic level

Reference: Mumford, Russell E. and John O. Whitaker, Jr. 1982. Mammals of Indiana. Indiana University Press, Bloomington, IN. 537 pp.





**Table 3. Response guilds of Indiana birds.**

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>Gavia immer</i> (Brunnich), common loon	5	5	5	1	1
<i>G. stellata</i> (Pontoppidan), red-throated loon	5	3	5	1	1
<i>Podiceps auritus</i> (Linnaeus), horned grebe	5	1	4	1	1
<i>P. grisegena</i> (Boddaert), red-necked grebe	5	1	5	1	1
<i>Podilymbus podiceps</i> (Linnaeus), pied-billed grebe	5	1	4	4	1
<i>Pelecanus erythrorhynchos</i> Gmelin, American white pelican	5	3	4	1	1
<i>Phalacrocorax auritus</i> (Lesson), double-crested cormorant	5	1	5	4	1
<i>Ardea herodias</i> Linnaeus, great blue heron	5	5	4	3	5
<i>Botaurus lentiginosus</i> (Rackett), American bittern	5	3	4	5	5
<i>Bubulcus ibis</i> (Linnaeus), cattle egret	5	1	4	1	0
<i>Butorides virescens</i> (Linnaeus), green heron	5	3	4	4	1
<i>Ardea alba</i> (Linnaeus), great egret	5	5	4	4	5
<i>Egretta caerulea</i> (Linnaeus), little blue heron	5	3	4	1	5
<i>E. thula</i> (Molina), snowy egret	5	3	4	0	1
<i>E. tricolor</i> (Müller), tricolored heron	5	3	4	1	1
<i>Ixobrychus exilis</i> (Gmelin), least bittern	5	3	4	4	5
<i>Nyctanassa violacea</i> (Linnaeus), yellow-crowned night-heron	5	5	4	4	5
<i>Nycticorax nycticorax</i> (Linnaeus), black-crowned night-heron	5	5	4	4	5
<i>Eudocimus albus</i> (Linnaeus), white ibis	5	3	4	0	1
<i>P. falcinellus</i> (Linnaeus), glossy ibis	5	5	4	0	1
<i>Cathartes aura</i> (Linnaeus), turkey vulture	0	1	4	3	1
<i>Coragyps atratus</i> (Bechstein), black vulture	0	1	4	5	1
<i>Anser albifrons</i> (Scopoli), greater white-fronted goose	5	3	2	2	3
<i>Branta bernicla</i> (Linnaeus), brant	5	5	3	1	3
<i>B. canadensis</i> (Linnaeus), Canada goose	5	1	2	3	3
<i>Chen caerulescens</i> (Linnaeus), snow goose	5	3	2	2	3
<i>C. rossii</i> (Cassin), Ross's goose	5	3	2	2	3

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>C. columbianus</i> (Ord), tundra swan	5	3	2	2	3
<i>C. olor</i> (Gmelin), mute swan	5	1	2	3	0
<i>Aix sponsa</i> (Linnaeus), wood duck	5	5	3	3	3
<i>Anas acuta</i> Linnaeus, northern pintail	5	1	2	2	3
<i>A. americana</i> Gmelin, American wigeon	5	3	1	2	3
<i>A. clypeata</i> Linnaeus, northern shoveler	5	1	1	1	3
<i>A. crecca</i> (Linnaeus), green-winged teal	5	3	2	2	3
<i>A. discors</i> Linnaeus, blue-winged teal**	5	3	1	5	3
<i>A. platyrhynchos</i> Linnaeus, mallard**	5	1	1	3	3
<i>A. rubripes</i> Brewster, American black duck	5	3	1	2	3
<i>A. strepera</i> Linnaeus, gadwall	5	3	1	2	3
<i>Aythya affinis</i> (Eyton), lesser scaup	5	3	4	2	3
<i>A. americana</i> (Eyton), redhead	5	3	2	1	3
<i>A. collaris</i> (Donovan), ring-necked duck	5	3	1	2	3
<i>A. marila</i> (Linnaeus), greater scaup	5	3	4	2	3
<i>A. valisineria</i> (Wilson), canvasback	5	5	3	1	3
<i>Bucephala albeola</i> (Linnaeus), bufflehead	5	3	4	2	3
<i>B. clangula</i> (Linnaeus), common goldeneye	5	5	1	2	3
<i>Clangula hyemalis</i> (Linnaeus), long-tailed duck	5	3	4	2	3
<i>Lophodytes cucullatus</i> (Linnaeus), hooded merganser	5	5	4	3	3
<i>Melanitta fusca</i> (Linnaeus), white-winged scoter	5	3	4	1	3
<i>M. nigra</i> (Linnaeus), black scoter	5	3	4	1	3
<i>M. perspicillata</i> (Linnaeus), surf scoter	5	3	4	1	3
<i>Mergus merganser</i> Linnaeus, common merganser	5	5	4	2	3
<i>Oxyura jamaicensis</i> (Gmelin), ruddy duck	5	3	2	2	3
<i>Pandion haliaetus</i> (Linnaeus), osprey	5	5	5	5	5
<i>Accipiter cooperii</i> (Bonaparte), Cooper's hawk	0	3	4	3	5
<i>A. gentilis</i> (Linnaeus), northern goshawk	0	3	4	1	1
<i>A. striatus</i> Vieillot, sharp-shinned hawk	0	3	4	2	5
<i>Buteo jamaicensis</i> (Gmelin), red-tailed hawk	0	1	4	3	1
<i>B. lagopus</i> (Pontoppidan), rough-legged hawk	0	3	4	2	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>B. lineatus</i> (Gmelin), red-shouldered hawk	1	3	4	3	5
<i>B. playpterus</i> (Vieillot), broad-winged hawk*	0	3	4	5	5
<i>Circus cyaneus</i> (Linnaeus), northern harrier**	3	3	4	3	5
<i>Haliaeetus leucocephalus</i> (Linnaeus), bald eagle	5	5	4	3	5
<i>Falco columbarius</i> Linnaeus, merlin	0	3	4	1	1
<i>F. peregrinus</i> Tunstall, peregrine falcon	0	5	4	3	5
<i>F. sparverius</i> Linnaeus, American kestrel	0	5	4	3	1
<i>Phasianus colchicus</i> Linn., ring-necked pheasant**	0	1	1	3	0
<i>Bonasa umbellus</i> (Linnaeus), ruffed grouse	0	3	1	3	3
<i>Meleagris gallopavo</i> Linnaeus, wild turkey	0	3	1	3	3
<i>Colinus virginianus</i> (Linnaeus), northern bobwhite**	0	1	1	3	3
<i>Coturnicops noveboracensis</i> (Gmelin), yellow rail	5	3	1	1	1
<i>Fulica americana</i> (Gmelin), American coot	5	1	1	3	1
<i>Gallinula chloropus</i> (Linnaeus), common moorhen	5	1	1	4	1
<i>Laterallus jamaicensis</i> (Gmelin), black rail	5	5	1	1	1
<i>Porzana carolina</i> (Linnaeus), sora	5	3	1	5	3
<i>Rallus elegans</i> Audubon, king rail	5	5	1	4	5
<i>R. limicola</i> Vieillot, Virginia rail	5	3	1	5	5
<i>Grus canadensis</i> (Linnaeus), sandhill crane	5	3	1	1	5
<i>Charadrius melodus</i> Ord, piping plover	5	5	4	1	5
<i>C. semipalmatus</i> Bonaparte, semipalmated plover	5	3	4	1	1
<i>C. vociferus</i> Linnaeus, killdeer**	0	1	4	3	4
<i>Pluvialis dominica</i> (Müller), American golden-plover	5	3	4	1	1
<i>P. squatarola</i> (Linnaeus), black-bellied plover	5	3	4	1	1
<i>Recurvirostra americana</i> Gmelin, American avocet	5	3	4	1	1
<i>Actitis macularia</i> (Linnaeus), spotted sandpiper	5	3	4	5	1
<i>Arenaria interpres</i> (Linnaeus), ruddy turnstone	5	3	4	1	1
<i>Bartramia longicauda</i> (Bechstein), upland sandpiper**	3	3	1	5	5
<i>C. alba</i> (Pallas), sanderling	5	3	4	1	1
<i>C. alpina</i> (Linnaeus), dunlin	5	3	4	1	1
<i>C. bairdii</i> (Coues), Baird's sandpiper	5	3	4	1	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>C. canutus</i> (Linnaeus), red knot	5	3	4	1	1
<i>C. fuscicollis</i> (Vieillot), white-rumped sandpiper	5	3	4	1	1
<i>C. himantopus</i> (Bonaparte), stilt sandpiper	5	3	4	1	1
<i>C. maritima</i> (Brünnich), purple sandpiper	5	3	4	0	1
<i>C. mauri</i> (Cabanis), western sandpiper	5	3	4	1	1
<i>C. melanotos</i> (Vieillot), pectoral sandpiper	5	3	4	1	1
<i>C. minutilla</i> (Vieillot), least sandpiper	5	3	4	1	1
<i>C. pusilla</i> (Linnaeus), semipalmated sandpiper	5	3	4	1	1
<i>Gallinago gallinago</i> (Linnaeus), common snipe	5	3	4	2	3
<i>Limnodromus griseus</i> (Gmelin), short-billed dowitcher	5	3	4	1	1
<i>L. scolopaceus</i> (Say), long-billed dowitcher	5	3	4	5	1
<i>Limosa fedoa</i> (Linnaeus), marbled godwit	5	3	4	1	1
<i>L. haemastica</i> (Linnaeus), Hudsonian godwit	5	3	4	1	1
<i>Scolopax minor</i> Gmelin, American woodcock	5	3	5	4	3
<i>Tringa flavipes</i> (Gmelin), lesser yellowlegs	5	3	4	1	1
<i>T. melanoleuca</i> (Gmelin), greater yellowlegs	5	3	4	1	1
<i>T. solitaria</i> Wilson, solitary sandpiper	5	3	4	1	1
<i>Tryngites subruficollis</i> (Vieillot), buff-breasted sandpiper	5	3	4	1	1
<i>Phalaropus fulicaria</i> (Linnaeus), red phalarope	5	3	4	1	1
<i>P. lobatus</i> (Linnaeus), red-necked phalarope	5	3	4	1	1
<i>P. tricolor</i> (Vieillot), Wilson's phalarope	5	3	4	1	1
<i>Larus argentatus</i> Pontoppidan, herring gull	5	1	1	3	1
<i>L. atricilla</i> Linnaeus, laughing gull	5	1	4	1	1
<i>L. delawarensis</i> Ord, ring-billed gull	5	1	1	3	1
<i>L. hyperboreus</i> Gunnerus, glaucous gull	5	1	1	1	1
<i>L. marinus</i> Linnaeus, great black-backed gull	5	1	1	1	1
<i>L. minutus</i> Pallas, little gull	5	1	4	0	1
<i>L. philadelphia</i> (Ord), Bonaparte's gull	5	1	4	2	1
<i>L. pipixcan</i> Wagler, Franklin's gull	5	1	4	1	1
<i>Rissa tridactyla</i> (Linnaeus), black-legged kittiwake	5	1	4	0	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>Chlidonias niger</i> (Linnaeus), black tern	5	3	4	5	5
<i>Sterna antillarum</i> (Lesson), least tern	5	3	4	1	5
<i>S. caspia</i> Pallas, Caspian tern	5	3	4	1	1
<i>S. forsteri</i> Nuttall, Forster's tern	5	3	1	1	1
<i>S. hirundo</i> Linnaeus, common tern	5	3	4	5	1
<i>C. livia</i> Gmelin, rock dove	0	1	2	3	0
<i>Streptopelia decaocto</i> (Frivaldszky), Eurasian collared-dove	0	1	3	3	0
<i>Zenaidura macroura</i> (Linnaeus), mourning dove**	0	1	2	3	0
<i>Coccyzus americanus</i> (Linnaeus), yellow-billed cuckoo*	0	1	1	5	1
<i>C. erythrophthalmus</i> (Wilson), black-billed cuckoo*	0	1	1	5	1
<i>Tyto alba</i> (Scopoli), barn owl	0	3	4	3	5
<i>Aegolius acadicus</i> (Gmelin), northern saw-whet owl	0	5	4	3	1
<i>Asio flammeus</i> (Pontoppidan), short-eared owl**	1	3	4	3	5
<i>A. otus</i> (Linnaeus), long-eared owl	0	3	4	3	5
<i>Bubo virginianus</i> (Gmelin), great horned owl	0	1	4	3	1
<i>Nyctea scandiaca</i> (Linnaeus), snowy owl	0	3	4	1	1
<i>Otus asio</i> (Linnaeus), eastern screech-owl	0	5	4	3	1
<i>Strix varia</i> Barton, barred owl	3	5	4	3	1
<i>Caprimulgus carolinensis</i> Gmelin, chuck-will's-widow	0	3	4	5	1
<i>C. vociferus</i> Wilson, whip-poor-will	0	3	4	5	1
<i>Chordeiles minor</i> (Forster), common nighthawk**	0	1	4	5	1
<i>Chaetura pelagica</i> (Linnaeus), chimney swift	0	1	4	5	1
<i>Archilochus colubris</i> (Linnaeus), ruby-throated hummingbird	1	1	3	5	1
<i>Ceryle alcyon</i> (Linnaeus), belted kingfisher	5	5	5	3	1
<i>Colaptes auratus</i> (Linnaeus), northern flicker	0	3	1	3	1
<i>Dryocopus pileatus</i> (Linnaeus), pileated woodpecker*	0	5	4	3	1
<i>Melanerpes carolinus</i> (Linnaeus), red-bellied woodpecker	1	3	1	3	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>M. erythrocephalus</i> (Linnaeus), red-headed woodpecker	1	3	1	3	1
<i>Picoides arcticus</i> (Swainson), black-backed woodpecker	0	5	4	0	1
<i>P. pubescens</i> (Linnaeus), downy woodpecker	0	1	4	3	1
<i>P. villosus</i> (Linnaeus), hairy woodpecker*	0	3	4	3	1
<i>Sphyrapicus varius</i> (Linnaeus), yellow-bellied sapsucker	0	5	1	5	1
<i>Contopus cooperi</i> (Nuttall), olive-sided flycatcher	1	3	4	5	1
<i>C. virens</i> (Linnaeus), eastern wood-pewee	0	1	4	5	1
<i>Empidonax alnorum</i> Brewster, alder flycatcher	3	3	4	5	1
<i>E. flaviventris</i> (Baird and Baird), yellow-bellied flycatcher	3	3	4	5	1
<i>E. minimus</i> (Baird and Baird), least flycatcher*	0	1	4	5	5
<i>E. traillii</i> (Audubon), willow flycatcher	3	1	4	5	1
<i>E. virescens</i> (Vieillot), Acadian flycatcher*	3	3	4	5	1
<i>Myiarchus crinitus</i> (Linnaeus), great crested flycatcher	0	3	4	5	1
<i>Sayornis phoebe</i> (Latham), eastern phoebe	3	1	4	4	1
<i>T. tyrannus</i> (Linnaeus), eastern kingbird	0	1	1	5	1
<i>T. verticalis</i> Say, western kingbird	0	1	1	2	1
<i>Lanius excubitor</i> Linnaeus, northern shrike	0	1	4	1	1
<i>L. ludovicianus</i> Linnaeus, loggerhead shrike**	0	1	4	1	5
<i>Vireo bellii</i> Audubon, Bell's vireo	0	3	4	5	1
<i>V. flavifrons</i> (Vieillot), yellow-throated vireo*	0	3	4	5	1
<i>V. gilvus</i> (Vieillot), warbling vireo	0	1	4	5	1
<i>V. griseus</i> (Boddaert), white-eyed vireo	1	1	4	5	1
<i>V. olivaceus</i> (Linnaeus), red-eyed vireo*	0	1	4	5	1
<i>V. philadelphicus</i> (Cassin), Philadelphia vireo	0	1	4	1	1
<i>V. solitarius</i> (Wilson), blue-headed vireo	0	3	4	5	1
<i>Corvus brachyrhynchos</i> Brehm, American crow	0	1	1	3	1
<i>C. corax</i> , common raven	1	3	1	3	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>C. ossifragus</i> Wilson, fish crow	3	1	1	3	1
<i>Cyanocitta cristata</i> (Linnaeus), blue jay	0	1	2	3	1
<i>Eremophila alpestris</i> (Linnaeus), horned lark**	0	1	1	3	1
<i>Hirundo rustica</i> Linnaeus, barn swallow	0	1	4	5	1
<i>Petrochelidon pyrrhonota</i> Vieillot, cliff swallow	1	1	4	5	1
<i>Progne subis</i> (Linnaeus), purple martin	1	5	4	5	1
<i>Riparia riparia</i> (Linnaeus), bank swallow	1	5	4	5	1
<i>Stelgidopteryx serripennis</i> (Audubon), northern rough-winged swallow	3	5	4	4	1
<i>Tachycineta bicolor</i> (Vieillot), tree swallow	1	5	4	5	1
<i>Baeolophus bicolor</i> Linnaeus, tufted titmouse*	1	3	1	3	1
<i>Poecile atricapillus</i> Linnaeus, black-capped chickadee	0	1	1	3	1
<i>P. carolinensis</i> Audubon, Carolina chickadee	0	1	1	3	1
<i>Sitta canadensis</i> Linnaeus, red-breasted nuthatch	0	5	1	3	1
<i>S. carolinensis</i> Latham, white-breasted nuthatch*	0	5	1	3	1
<i>Certhia americana</i> Bonaparte, brown creeper*	1	5	4	3	5
<i>Cistothorus palustris</i> (Wilson), marsh wren	5	3	4	4	5
<i>C. platensis</i> (Latham), sedge wren**	3	5	4	4	5
<i>Thryomanes bewickii</i> (Audubon), Bewick's wren	0	1	4	0	5
<i>Thryothorus ludovicianus</i> (Latham), Carolina wren	0	1	4	3	1
<i>Troglodytes aedon</i> Vieillot, house wren	0	1	4	4	1
<i>T. troglodytes</i> (Linnaeus), winter wren	3	3	4	3	1
<i>Regulus calendula</i> (Linnaeus), ruby-crowned kinglet	1	3	1	2	1
<i>R. satrapa</i> Lichtenstein, golden-crowned kinglet	1	3	4	3	1
<i>Poliophtila caerulea</i> (Linnaeus), bluegray gnatcatcher*	1	3	4	5	1
<i>Catharus fuscescens</i> (Stephens), veery*	3	3	1	5	1
<i>C. guttatus</i> (Pallas), hermit thrush	1	3	1	3	1
<i>C. minimus</i> (Lafresnaye), gray-cheeked thrush	1	3	1	2	1
<i>C. ustulatus</i> (Nuttall), Swainson's thrush	1	3	1	5	1
<i>Hylocichla mustelina</i> (Gmelin), wood thrush*	0	3	1	5	1
<i>S. sialis</i> (Linnaeus), eastern bluebird	0	5	1	3	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>Turdus migratorius</i> Linnaeus, American robin	0	1	1	3	1
<i>Dumetella carolinensis</i> (Linnaeus), gray catbird	1	1	1	3	1
<i>Mimus polyglottos</i> (Linnaeus), northern mockingbird	0	1	1	3	1
<i>Toxostoma rufum</i> (Linnaeus), brown thrasher	0	1	1	3	1
<i>Sturnus vulgaris</i> Linnaeus, European starling	0	3	1	3	0
<i>Anthus rubescens</i> (Tunstall), American pipit	3	1	4	1	1
<i>Bombycilla cedrorum</i> Vieillot, cedar waxwing	0	1	3	3	1
<i>Dendroica caerulescens</i> (Gmelin), black-throated blue warbler	1	3	4	5	1
<i>D. castanea</i> (Wilson), bay-breasted warbler	1	3	4	1	1
<i>D. cerulea</i> (Wilson), cerulean warbler*	1	5	4	5	5
<i>D. coronata</i> (Linnaeus), yellow-rumped warbler	1	3	1	5	1
<i>D. discolor</i> (Vieillot), prairie warbler	0	1	4	5	1
<i>D. dominica</i> (Linnaeus), yellow-throated warbler*	1	3	4	5	1
<i>D. fusca</i> (Müller), blackburnian warbler	1	5	4	5	1
<i>D. magnolia</i> (Wilson), magnolia warbler	0	1	4	5	1
<i>D. palmarum</i> (Gmelin), palm warbler	3	3	4	1	1
<i>D. pensylvanica</i> (Linnaeus), chestnut-sided warbler*	0	1	4	5	1
<i>D. petechia</i> (Linnaeus), yellow warbler	3	1	4	5	1
<i>D. pinus</i> (Wilson), pine warbler	0	3	4	5	1
<i>D. striata</i> (Forster), blackpoll warbler	0	3	4	1	1
<i>D. tigrina</i> (Gmelin), Cape May warbler	0	5	4	1	1
<i>D. virens</i> (Gmelin), black-throated green warbler	0	3	4	5	1
<i>Geothlypis trichas</i> (Linn.), common yellowthroat**	3	1	4	4	1
<i>Helmitheros vermivorus</i> (Gmelin), worm-eating warbler*	1	3	4	5	5
<i>Icteria virens</i> (Linnaeus), yellow-breasted chat	1	3	1	5	1
<i>Mniotilta varia</i> (Linnaeus), black-and-white warbler*	0	3	4	5	5
<i>Oporornis agilis</i> (Wilson), Connecticut warbler	1	3	4	1	1
<i>O. formosus</i> (Wilson), Kentucky warbler*	1	3	4	5	1
<i>O. philadelphia</i> (Wilson), mourning warbler*	1	3	4	5	1



Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>Parula americana</i> (Linnaeus), northern parula*	1	5	4	5	1
<i>Protonotaria citrea</i> (Boddaert), prothonotary warbler	5	5	4	5	1
<i>Seiurus aurocapillus</i> (Linnaeus), ovenbird*	0	3	4	5	1
<i>S. motacilla</i> (Vieillot), Louisiana waterthrush*	5	3	4	5	1
<i>S. noveboracensis</i> (Gmelin), northern waterthrush	5	3	4	5	1
<i>Setophaga ruticilla</i> (Linnaeus), American redstart*	0	1	4	5	1
<i>Vermivora celata</i> (Say), orange-crowned warbler	0	1	4	1	1
<i>V. chrysoptera</i> (Linnaeus), golden-winged warbler	1	1	4	5	5
<i>V. peregrina</i> (Wilson), Tennessee warbler	0	1	4	1	1
<i>V. pinus</i> (Linnaeus), blue-winged warbler	0	1	4	5	1
<i>V. ruficapilla</i> (Wilson), Nashville warbler	1	1	4	5	1
<i>Wilsonia canadensis</i> (Linnaeus), Canada warbler	1	1	4	5	5
<i>W. citrina</i> (Boddaert), hooded warbler*	3	3	4	5	5
<i>W. pusilla</i> (Wilson), Wilson's warbler	3	3	4	1	1
<i>P. olivacea</i> (Gmelin), scarlet tanager*	0	1	1	5	1
<i>P. rubra</i> (Linnaeus), summer tanager*	0	3	1	5	1
<i>Ammodramus henslowii</i> (Audubon), Henslow's sparrow**	0	3	1	4	5
<i>A. leconteii</i> (Audubon), LeConte's sparrow	1	5	4	1	1
<i>A. nelsoni</i> (Allen), Nelson's sharp-tailed sparrow	3	5	4	1	1
<i>A. savannarum</i> (Gmelin), grasshopper sparrow**	0	1	1	4	1
<i>Calcarius lapponicus</i> (Linnaeus), Lapland longspur	0	1	2	2	1
<i>C. pictus</i> (Swainson), Smith's longspur	0	3	4	1	1
<i>Chondestes grammacus</i> (Say), lark sparrow**	0	5	4	4	1
<i>Junco hyemalis</i> (Linnaeus), dark-eyed junco	0	1	1	3	1
<i>Melospiza georgiana</i> (Latham), swamp sparrow**	3	3	1	3	1
<i>M. lincolni</i> (Audubon), Lincoln's sparrow	1	3	1	1	1
<i>M. melodia</i> (Wilson), song sparrow**	1	1	1	3	1
<i>Passerculus sandwichensis</i> (Gmelin), savannah sparrow**	1	1	1	4	1
<i>Passerella iliaca</i> (Merrem), fox sparrow	0	1	1	1	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>P. erythrophthalmus</i> (Linnaeus), eastern towhee	0	1	1	4	1
<i>Plectrophenax nivalis</i> (Linnaeus), snow bunting	0	1	2	2	1
<i>Poocetes gramineus</i> (Gmelin), vesper sparrow**	0	1	1	4	1
<i>Spizella arborea</i> (Wilson), American tree sparrow	0	1	2	2	1
<i>S. passerina</i> (Bechstein), chipping sparrow	0	1	1	4	1
<i>S. pusilla</i> (Wilson), field sparrow**	0	1	1	3	1
<i>Zonotrichia albicollis</i> (Gmelin), white-throated sparrow	0	1	1	3	1
<i>Z. leucophrys</i> (Forster), white-crowned sparrow	0	1	1	2	1
<i>Cardinalis cardinalis</i> (Linnaeus), northern cardinal	0	1	2	3	1
<i>Guiraca caerulea</i> (Linnaeus), blue grosbeak	0	1	1	5	1
<i>P. cyanea</i> (Linnaeus), indigo bunting	1	1	1	5	1
<i>Pheucticus ludovicianus</i> (Linnaeus), rose-breasted grosbeak	0	1	1	5	1
<i>Spiza americana</i> (Gmelin), dickcissel**	0	1	1	3	1
<i>Agelaius phoeniceus</i> (Linn.), red-winged blackbird**	3	1	1	3	1
<i>Dolichonyx oryzivorus</i> (Linnaeus), bobolink**	1	1	1	5	1
<i>Euphagus carolinus</i> (Müller), rusty blackbird	3	3	1	1	1
<i>E. cyanocephalus</i> (Wagler), Brewer's blackbird	0	1	1	1	5
<i>Icterus galbula</i> (Linnaeus), Baltimore oriole	0	1	1	5	1
<i>I. spurius</i> (Linnaeus), orchard oriole	0	1	4	5	1
<i>Molothrus ater</i> (Boddaert), brown-headed cowbird	0	1	1	3	1
<i>Q. quiscula</i> (Linnaeus), common grackle	0	1	1	3	1
<i>Sturnella magna</i> (Linnaeus), eastern meadowlark**	0	1	1	3	1
<i>Xanthocephalus xanthocephalus</i> (Bonaparte), yellow-headed blackbird	3	3	1	0	5
<i>Carduelis flammea</i> (Linnaeus), common redpoll	0	1	2	1	1
<i>C. hornemanni</i> (Holböll), hoary redpoll	0	1	2	0	1
<i>C. pinus</i> (Wilson), pine siskin	0	3	1	3	1
<i>C. tristis</i> (Linnaeus), American goldfinch**	0	1	2	3	1
<i>Carpodacus mexicanus</i> (Müller), house finch	0	1	2	3	0
<i>C. purpureus</i> (Gmelin), purple finch	0	1	2	2	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Season <sup>d</sup>	Status
<i>Coccothraustes vespertinus</i> (Cooper), evening grosbeak	0	3	2	2	1
<i>Loxia curvirostra</i> Linnaeus, red crossbill	0	3	3	2	1
<i>L. leucoptera</i> Gmelin, white-winged crossbill	0	3	3	1	1
<i>Pinicola enucleator</i> (Linnaeus), pine grosbeak	0	3	2	2	1
<i>Passer domesticus</i> (Linnaeus), house sparrow	0	1	1	3	0

<sup>a</sup>Wet-dep = Wetland dependence

<sup>b</sup>Hab-spec = Habitat specificity

<sup>c</sup>Trophic = Trophic level

<sup>d</sup>Season = Seasonality

\* Denotes Sensitive to Forest Fragmentation

\*\* Denotes Sensitive to Prairie and Grassland Fragmentation

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**Table 4. Response guilds of Indiana amphibians.**

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Status
<i>Cryptobranchus alleganiensis</i> (Daudin), hellbender	5	5	4	5
<i>Necturus maculosus</i> (Rafinesque), mudpuppy	5	5	4	1
<i>Ambystoma barbouri</i> Kraus and Petranka, streamside salamander	3	3	4	5
<i>A. jeffersonianum</i> (Green), Jefferson's salamander	3	3	4	1
<i>A. laterale</i> Hallowell, blue-spotted salamander	3	3	4	5
<i>A. maculatum</i> (Shaw), spotted salamander	3	3	4	1
<i>A. opacum</i> (Gravenhorst), marbled salamander	3	3	4	1
<i>A. texanum</i> (Matthes), smallmouth salamander	3	3	4	1
<i>A. tigrinum</i> (Green), tiger salamander	5	3	4	1
<i>Notophthalmus viridescens</i> (Rafinesque), eastern newt	5	1	4	1
<i>Aneides aeneus</i> (Cope & Packard), green salamander	3	5	4	5
<i>Desmognathus fuscus</i> (Green), northern dusky salamander	3	3	4	1
<i>Eurycea cirrigera</i> (Green), two-lined salamander	3	3	4	1
<i>E. longicauda</i> (Green), longtail salamander	3	5	4	1
<i>E. lucifuga</i> Rafinesque, cave salamander	3	5	4	1
<i>Hemidactylium scutatum</i> (Schlegel), four-toed salamander	3	3	4	5
<i>Plethodon cinereus</i> (Green), redback salamander	1	3	4	1
<i>P. dorsalis</i> Cope, zigzag salamander	1	3	4	1
<i>P. glutinosus</i> (Green), slimy salamander	1	3	4	1
<i>P. richmondi</i> Netting and Mittleman, ravine salamander	1	3	4	5
<i>Pseudotriton ruber</i> (Sonnini), northern red salamander	3	3	4	5
<i>Siren intermedia</i> Le Conte, lesser siren	5	5	4	1
<i>Scaphiopus holbrookii</i> (Harlan), eastern spadefoot	1	3	4	5
<i>Bufo americanus</i> Holbrook, American toad	3	1	4	1
<i>B. fowleri</i> Hinkley, Fowler's toad	3	1	4	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Status
<i>Acris crepitans</i> Baird, cricket frog	3	1	4	1
<i>Hyla chrysoscelis</i> Cope, Cope's gray tree frog	3	1	4	1
<i>H. versicolor</i> Le Conte, eastern gray treefrog	3	1	4	1
<i>Pseudacris crucifer</i> Wied, spring peeper	3	1	4	1
<i>P. triseriata</i> (Wied), western chorus frog	3	1	4	1
<i>Rana areolata</i> Baird and Girard, crawfish frog	3	3	4	5
<i>R. blairi</i> Mecham et al., plains leopard frog	3	1	4	5
<i>R. clamitans</i> Latreille, green frog	5	3	4	1
<i>R. catesbeiana</i> Shaw, bullfrog	5	3	4	3
<i>R. pipiens</i> Schreber, northern leopard frog	3	1	4	5
<i>R. palustris</i> LeConte, pickerel frog	3	1	4	1
<i>R. utricularia</i> Harlan, southern leopard frog	3	1	4	1
<i>R. sylvatica</i> LeConte, wood frog	3	1	4	1

<sup>a</sup>Wet-dep = Wetland dependence

<sup>b</sup>Hab-spec = Habitat specificity

<sup>c</sup>Trophic = Trophic level

Reference: Minton, S. A. 1972. Amphibians and Reptiles of Indiana. Proceedings of the Indiana Academy of Science, Monograph #3. 346 pp.

**Table 5. Response guilds of Indiana reptiles.**

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Status
<i>Chelydra serpentina</i> Linnaeus, common snapping turtle	5	1	1	1
<i>Macrocllemys temminckii</i> (Troost), alligator snapping turtle	5	1	4	5
<i>Kinosternon subrubrum</i> (Lacepede), eastern mud turtle	5	3	1	5
<i>Sternotherus odoratus</i> (Latreille), common musk turtle	5	3	4	1
<i>Chrysemys picta</i> (Schneider), painted turtle	5	1	1	1
<i>Clemmys guttata</i> (Schneider), spotted turtle	5	3	1	5
<i>Emydoidea blandingii</i> (Holbrook), Blanding's turtle	5	5	4	5
<i>Graptemys geographica</i> (LeSueur), map turtle	5	3	1	1
<i>G. pseudogeographica</i> (Gray), false map turtle	5	3	1	1
<i>G. ouachitensis</i> Cagle, Ouachita map turtle	5	3	1	1
<i>Pseudemys concinna</i> (LeConte), river cooter	5	3	1	5
<i>Terrapene carolina</i> (Linnaeus), eastern box turtle	0	1	1	1
<i>T. ornata</i> (Agassiz), ornate box turtle	0	1	4	5
<i>Trachemys scripta</i> (Schoepff), red-eared turtle	5	3	1	1
<i>Apalone mutica</i> LeSueur, smooth softshell	5	5	4	5
<i>A. spinifera</i> (LeSueur), spiny softshell	5	5	4	1
<i>Sceloporus undulatus</i> Latreille, eastern fence lizard	0	1	4	1
<i>Ophisaurus attenuatus</i> Cope, slender glass lizard	0	1	4	1
<i>Cnemidophorus sexlineatus</i> (Linnaeus), six-lined racerunner	0	1	4	1
<i>Eumeces fasciatus</i> (Linnaeus), five-lined skink	0	1	4	1
<i>E. laticeps</i> (Schneider), broad-headed skink	0	1	4	1
<i>Scincella lateralis</i> (Say), ground skink	0	1	4	1
<i>Carphophis amoenus</i> (Say), worm snake	0	3	4	1
<i>Cemophora coccinea</i> (Blumenbach), scarlet snake	0	3	4	5
<i>Coluber constrictor</i> Linnaeus, black racer	0	1	4	1

Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Status
<i>Clonophis kirtlandii</i> (Kennicott), Kirtland's snake	3	3	4	5
<i>Diadophis punctatus</i> (Linnaeus), northern ringneck snake	0	3	4	1
<i>Elaphe obsoleta</i> (Say), black rat snake	0	1	4	1
<i>E. vulpina</i> (Baird and Girard), western fox snake	0	1	4	1
<i>Heterodon platyrhinos</i> Latreille, eastern hognose snake	0	1	5	1
<i>Lampropeltis calligaster</i> (Harlan), prairie kingsnake	0	3	4	1
<i>L. getulus</i> (Linnaeus), common kingsnake	0	1	4	1
<i>L. triangulum</i> (Lacepede), eastern milksnake	0	1	4	1
<i>Nerodia erythrogaster</i> (Forster), northern copperbelly	5	3	4	5
<i>N. rhombifer</i> (Hallowell), diamondback water snake	5	3	4	1
<i>N. sipedon</i> (Linnaeus), banded water snake	5	1	4	1
<i>Opheodrys aestivus</i> (Linnaeus), rough green snake	0	3	4	5
<i>O. vernalis</i> (Harlan), smooth green snake	0	3	4	5
<i>Pituophis catenifer</i> (Blainville), bull snake	0	3	4	1
<i>Regina septemvittata</i> (Say), queen snake	5	3	4	1
<i>Storeria dekayi</i> (Holbrook), brown snake	0	1	4	1
<i>S. occipitomaculata</i> (Storer), red-bellied snake	0	3	4	1
<i>Tantilla coronata</i> (Baird and Girard), crowned snake	0	3	4	5
<i>Thamnophis butleri</i> (Cope), Butler's garter snake	0	3	4	5
<i>T. proximus</i> (Say), western ribbon snake	0	3	4	5
<i>T. radix</i> (Baird and Girard), plains garter snake	0	3	4	1
<i>T. sauritus</i> (Linnaeus), eastern ribbon snake	1	3	4	1
<i>T. sirtalis</i> (Linnaeus), common garter snake	1	1	4	1
<i>Virginia valeriae</i> Baird and Girard, western earth snake	0	1	4	1
<i>Agkistrodon contortrix</i> (Linnaeus), northern copperhead	0	3	4	1
<i>A. piscivorus</i> Lacepede, cottonmouth	5	5	5	5



<i>Crotalus horridus</i> Linnaeus, timber rattlesnake	0	3	4	5
Species	Wet-dep <sup>a</sup>	Hab-spec <sup>b</sup>	Trophic <sup>c</sup>	Status
<i>Sistrurus catenatus</i> (Rafinesque), eastern massasauga	5	5	4	5

<sup>a</sup> Wet-dep = Wetland dependence

<sup>b</sup> Hab-spec = Habitat specificity

<sup>c</sup> Trophic = Trophic level

Reference: Minton, S. A. 1972. Amphibians and Reptiles of Indiana. Proceedings of the Indiana Academy of Science, Monograph #3. 346 pp.

